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# ROYAL GEOGRAPHICAL SOCIETY.

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# TRAVELS AND RESEARCHES

IN THE

# INTERIOR OF CHINA.

By E. COLBORNE BABER,

CHINESE SECRETARY OF LEGATION, PEKING.

# TRAVELS AND RESEARCHES

IN THE

# INTERIOR OF CHINA.

By E. Colborne Baber, Chinese Secretary of Legation, Peking.*

## I. A JOURNEY OF EXPLORATION IN WESTERN SSŬ-CH'UAN.

(Read at the Evening Meeting, June 13th, 1881.)

Maps, p. 202.

### 1. On the Road to the Capital.

I passed under the western gate of Ch'ung-ch'ing on the morning of July 8th, 1877, full of the pleasurable anticipation which precedes a plunge into the unknown. The road from Ch'ung-ch'ing to the provincial capital had, it is true, been already trodden by more than one European; but beyond that point the whole of the western border, with slight exception, was untraversed. My project was, after reaching Ch'êng-tu, to make an excursion to the sacred mountain of Omi, and thence, travelling viâ Ya-chou, to descend into Yünnan by way of Chien-ch'ang—a route of which no account exists, except the short notes left us by Marco Polo. From Yünnan I intended to return by following as closely as possible the banks of the Upper Yangtzŭ. I was fortunate enough to complete the journey with no sort of serious difficulty and but little inconvenience.

A word or two with respect to transport may be useful. No traveller in Western China who possesses any sense of self-respect should journey without a sedan chair, not necessarily as a conveyance, but for the honour and glory of the thing. Unfurnished with this indispensable token of respectability, he is liable to be thrust aside on the highway, to be kept waiting at ferries, to be relegated to the worst inn's worst room, and generally to be treated with indignity or, what is sometimes worse, with familiarity, as a peddling footpad who, unable to gain a living in his own country, has come to subsist on China. A chair is far more effective than a passport. One may ride on pony-back, but a chair should be in attendance. I venture to attribute Baron v. Richthofen's

* With additional footnotes supplied by Colonel H. Yule, C.B., and Captain W. Gill, R.E. These notes are distinguished from those of Mr. Baber by the initials of their authors.

unlucky encounter on the pass above Ch'ing-ch'i Hsien partly to his having travelled without a chair; indeed, the natives told me that, seeing him ride about the country in what appeared to them a vague and purposeless manner, they imagined him to be a fugitive from some disastrous battle. A chair is, moreover, very useful as the safest vehicle for carrying instruments, and for stowing away all those numerous odds and ends which it is troublesome to unpack frequently from trunks. The mat cushions and arm-pillows with which it is furnished make the coolest and most comfortable bed which can be wished for in hot weather, when laid upon a couple of square tables or a stratum of planks. My coolies were hired by the month, at 300 cash—about tenpence—per diem for each man. The conventional stipulation is to pay only 100 cash on days when no travelling is done; but, as the weather was at its hottest and I did not intend to linger on the road, this clause was omitted. The traveller should have a written agreement made out, and should insist upon having a *fu-t'ou*, or head coolie, among his men, who will be responsible for their discipline.

The comfort and convenience of a traveller is very much at the mercy of these porters, more especially in the case of a foreigner. It is far preferable to engage them from a Fu-hong, an establishment licensed for the purpose by the local government. Coolies can be hired off the street more cheaply, but the traveller will possess little control over them. Each porter has to pay ten cash a day to the Fu-hong, which appoints a fu-t'ou to represent its authority *en route*, and to collect the percentage. The reason of this apparent extortion is that native officials travel free of expense for coolies and baggage animals, and the burden falls upon the Fu-hong, which has to supply them gratis. The percentage paid by every coolie—or rather, by every private traveller—is by way of providing for such contingencies, and of yielding beyond these a sufficient surplus for the keeper of the establishment. I engaged fifteen coolies, and was therefore paying about sixpence a day for the travelling expenses of native functionaries.

In addition to this levy by the manager of the Fu-hong, the fu-t'ou also collects a similar percentage for his own use and emolument. In return for this privilege he is expected to find substitutes for coolies who may fall sick on the road, to be responsible for losses and thefts, to watch the baggage during halts, and generally to maintain order and discipline. The western Chinese are a fair-dealing, justice-loving people, and the fu-t'ou is always a person of prominent honesty. When, therefore, an exorbitant demand has to be made, he invariably suborns one of his coolies to put it forward, and when the exaction is detected, he is the first to condemn the odious conduct of the extortioner.

Crossing the grave-covered hills outside the city, we soon reached the fortified post of Fu-t'ou-kuan, about four miles' distance, a remarkably picturesque knoll protecting the isthmus of the peninsula of rock

on which Ch'ung-ch'ing is built. So long as the encircling rivers are commanded, and this outpost is held, Ch'ung-ch'ing is secure from attack. Here the road divides, one branch leading to Pi-shan Hsien, and the other, which we were to follow, being the great highway through Western Ssŭ-ch'uan, and probably the finest road in China. For a few miles beyond it would be considered a handsome road in any country. Passing under numerous stone portals (*p'ai-lou* or *p'ai-fang*) of massive structure and elaborate carving, and paved with large sandstone slabs or cut through the solid rock, the avenue winds along between rows of huge commemorative tablets. These are monoliths rising in some cases 22 feet above ground, in proportion much like the larger masses of Stonehenge, and engraved with deeply cut characters. They are all more or less recent, as also are the p'ai-lous. The roadway may be said to be undergoing constant renewal wherever it is hewn in the rock, for many of the beggars, who abound near this point, are armed with iron-pointed sticks, with which they prod out an infinitesimal particle of rock while entreating the alms of passers.

Three days' journey of 17 or 18 miles each, carried us to Yung-ch'uan, the first city on the highroad to the capital, through a very broken country, crossed at intervals of about seven miles by ranges of 1000 feet or less elevation above the general level, which run approximately N.N.E. As seen from the road, the land is rather sparsely wooded with bamboo, cypress, oak (Ch'ing-kang), and with the wide-branching banyan, the only use of which seems to be to afford its invaluable shade to wayfarers. Cultivation is everywhere dense; indeed, with the exception of graves and the immediate neighbourhood of houses, and Government works such as the ancient walls which here and there close the approach to a pass over the hills, and the few slopes which are too steep for agriculture, every spot of ground is tilled, and most of it terraced. Not much store is set by the wheat crop, the Ssŭch'uanese being, at any rate in the southern districts, a rice-eating people. The rains are very irregular. The present year, however (1879), has returned a good rice crop, reputed to be nine-tenths of the best possible harvest; and my register shows that rain fell on ten days in April, eleven in May, thirteen in June, and seven in July. Success seems to depend chiefly upon a plentiful rainfall in June and fine weather in July, but in the early part of the latter month a moderate fall is desirable. Maize and millet have this year shown a deficiency of 50 per cent. below the assumed maximum, owing to the July dryness, but a failure of these crops, which are devoted principally to the distillation of spirits, is not a serious disaster. On the Tibetan border, but still on the great plateau, i.e. in the region of which Batang may be considered the centre, the rainy season is almost perfectly regular, extending from the beginning of June to the middle of August, the rest of the year being fine; and from what I can gather, this weather system impinges variably upon

Western Ssŭ-ch'uan, making July, which independently should be, perhaps, our dryest month in Ch'ung-ch'ing, a very untrustworthy season. Thus, in July 1878 rain fell on fifteen days. Famines of wide extent are not frequent in the province, but it is easy to gather from the gossip of country folk that local scarcity is neither unknown nor unexpected. It might be supposed that the numerous rivers which permeate the country between Ch'ung-ch'ing and the capital would be available for purposes of irrigation; but they pass through it without effectually watering it. There are few rivulets, and the surface is so irregularly worn down that there are almost no flat valleys; even level bottom lands of small extent are rarely met with. The fields, therefore, lie too high above the water-courses to be irrigated from them by means of the usual machines. The soil, again, is by no means rich, and is generally very shallow.

Nevertheless, the industrious and timely care of a numerous population has made the district the greenest of all Chinese hill-grounds. Without much claim to the grandeur of abruptness, although some of the ranges rise to 1500 feet above the hollows, the scenery possesses a tranquil charm too varied to be monotonous. The face of the country is all broken up into little nooks, amphitheatres, and dells, so that the road is always turning corners and winding into new prospects, and when it ascends a ridge it sometimes almost loses itself among shrubberies and plantations, which cut off the view of cultivation, and give a sudden impression of seclusion.

Besides the usual farm produce, and a good deal of opium, the district possesses mines of iron and coal. It is very possible that the latter may, before long, when steamers ply on the Upper Yang-tzŭ, develop into an important source of trade. Even at present it is worked on a considerable scale in a range four or five miles west of a village named Ma-fang Bridge, which seems to be the centre of the coal trade, and to which the output is carried, among other modes of transport, on the backs of cattle shod with straw sandals. I was told that the principal mines are eight or ten in number, and that one of them keeps a hundred men at work day and night to draw the coal from the workings to the pit's mouth. Each man is said to bring away about a hundredweight ten times in the twenty-four hours, which would give 50 tons per diem for one pit, no small production for a Chinese mine. At Ma-fang Bridge the coal sells for 100 cash per cwt., but at the pits the same quantity may be had for 70 cash, or say five shillings a ton. A small river runs through the village, and will one day, it is to be hoped, float the coal down to the Yang-tzŭ. The range where the seam occurs is locally celebrated for its general productiveness; the natives are fond of impressing upon visitors the information that "coal grows inside it, and opium outside."

Another local lion is the bridge which gives its name to the village of Ma-fang. A really pleasing tradition is attached to this unpretending

arch, and is worth recording, if for no other reason than its novelty amid the odious bathos of stories about dragons and phœnixes which form the stock of Chinese folk-lore. The legend relates that when the bridge was completed, and the opening day dawned, a wedding procession escorting a newly-married bride happened to come down the road. It is a custom, or for the credit of the story is said to be a custom, that the person who first crosses a new bridge should be allowed the privilege of naming it; but in practice an official of all available distinction is induced to lend his presence for the occasion. On the day in question, however, the local magnate was not forthcoming, so the engineer, with phenomenal gallantry for a Chinaman, invited the bride to supply a name, which she did in an impromptu verse to this effect:—

"Across a new-made bridge to-day,
A new-made bride I take my way;
The bridge shall bear the bridal sign
And join my husband's name with mine."

The bride's name was "Fang," and the husband's "Ma," and the bridge is called Ma-fang Bridge to this day. The story obviously ought to be true, but, if it is not, the reason is that young Chinese ladies have neither permission, courage, nor ability, to pronounce themselves in such fashion.

We were to have lodged, the first night of our journey, in the large village of Pai-shih-yi, but at 10 P.M. the thermometer showed 93°, and in the crowded precincts of the inn 95°. Sleep being utterly out of question, I started again at 11 P.M., and walked on through the night, having been told of a high ridge, six or seven miles ahead, on the crest of which I hoped to find four or five degrees of lower temperature; but it was not until two o'clock in the morning that I neared its base, only to find it separated from me by a deep glen hidden in such trackless obscurity that it was impossible to find the way across. The night, though moonless, was astonishingly brilliant; Mars, Jupiter, and Saturn were all blazing simultaneously, and it was precisely this illumination which threw the hollow into so dense a shadow. The village of Tsou-ma-kang is built on the hither side of the glen, and I looked about for a spare corner of street to sleep on during the cool hour which precedes dawn; but the villagers, driven out of their houses by the heat, were lying naked on the pavement, and what was still more repulsive, they had lighted fires in the roadway to keep off mosquitos. It is odd how populous a village looks when all its inhabitants, or at any rate the male division, are spread out lengthwise on the streets. There was no help for it but to retrace a good deal of road in search of a clear spot on which to take a nap; and a proof of the density of cultivation in this part, which is one of the few flats, comparatively speaking, of Ssŭ-ch'uan, is that I spent a good half-hour in finding a bare space large enough to lie on. The roadway was not available,

for passengers were trooping along it pretty continuously. Hiring one of these to fan me, for my cavalcade had not come on, I slept until shortly after daybreak, and then crossed the glen, finding on the other side a cool hill-top crowned by an ancient fortification. Near the summit a fresh, clear stream, the only cold water in the country at such a season, issues from a spring and winds down the sward. Future travellers who may journey westward from Ch'ung-ch'ing in the summer, will do well to make this point their first stage.

Yung-ch'uan is a mere country town, possessing no manufacture except that of paper fans, for which it has gained a certain celebrity. A curious industry carried on in its vicinity is that of pickling frogs. The animals are captured by angling in the paddy-fields, and the hind legs are cut off, dried, salted, and sprinkled with chili pepper. Frogs are eaten pretty generally all over China, but I never before heard of this process of pickling.

As the river, which runs six miles or so beyond Yung-ch'uan, is neared, a belt of country of a more broken and irregular nature is entered. As above remarked the hill-systems of this part of the province run N.N.E. and S.S.W., but the general fall of level of the country is at right angles to this direction, and is followed by the rivers which pay their tribute to the Yangtzŭ. Such a condition compels the rivers to pierce or turn innumerable obstacles, and gives them very devious courses, which add greatly to the picturesqueness of the district. On the southern side of the Yangtzŭ much the same character prevails, with the exception that the general slope occurs in a converse sense, and is more severe, the level rising somewhat rapidly towards the border of Kuei-chou, and the mountains being much higher and strangely abrupt. And whereas the rivers on the left bank of the Yangtzŭ have overcome all obstacles with fair success, some of the streams on the other side have broken down altogether, and failed to make a passage. When a deadlock of this nature occurs the stream undermines the sandstone and disappears into a chasm to reissue, no doubt, further on. It seems evident that the hollows where this phenomenon occurs must have been lakes at no remote period; indeed, in many places they still form intermittent lakes, the access of water during the spring and early summer months being too great to find free exit through the tunnels. It thus happens every few years that productive rice-bottoms are inundated and yield nothing. The population of such valleys, which in favourable years are of course the most fertile, subscribe from time to time a good deal of money for schemes of drainage, but with very little effective result. This seems a point where the skill of European engineers might be introduced with certain and speedy advantage. A steam pump or two, or perhaps some adaptation of the siphon principle would easily drain off the greater part of such shallow overflows.

The river which the high road crosses by the Shuang-shih bridge a few miles beyond Yung-ch'uan, has an exceptional northern course, and winds delightfully along through a succession of wide pools, separated by beds of rocks and overhung by wooded cliffs. The bridge, evidently a structure of great age, which has undergone frequent restoration, is of a very primitive construction. Stone slabs piled rudely one on another form the piers, which support wooden beams laid across them. The foot-way is forty yards long, and is roofed throughout like all the wooden bridges of Ssŭ-ch'uan. It is surprising to meet with structures of this rudimentary nature in a province where stone is employed in huge masses with an apparent carelessness of expense, and which boasts the finest stone arches in China. In this instance the bridge is very ancient, and it has been found more convenient to repair it than to replace it; but the same style is still employed in cases where the timid Chinese mason considers the channel too broad for an arch.

A little conversation with natives soon satisfies the traveller that Ssŭ-ch'uan is practically a young province. They speak of K'ang-hsi and Kien-lung as monarchs of remote antiquity, and their chronology hardly reaches further back than the end of the Mings, about 1645. That the country was peopled, or more correctly speaking repeopled, in the early part of the present dynasty, is, however, an historical fact which does not require any additional proof. Some scant account of the anarchy which depopulated the province during the progress of the Tartar invasion will be found in the concluding chapters of De Mailla's 'History of China,' and is no doubt based on the experience of Jesuit missionaries who were in Ssŭ-ch'uan during the period described, for there is, of course, no Chinese history of the time. The most remarkable and ultimately almost the only figure in the story is a certain Chang Hsien-chung, who gained possession of the province in 1644 and proclaimed himself Emperor of the West in Ch'êng-tu. There is a difficulty in the way of understanding the policy of this ruler, which it is to be feared will always remain insuperable, for his simple mode of government was literally to condemn all his subjects to summary execution. I have collected from De Mailla the subjoined list of some of the reforms which the imperial nihilist introduced:—

*Massacred.*—32,310 undergraduates; 3000 eunuchs; 2000 of his own troops; 27,000 Buddhist priests; 600,000 inhabitants of Ch'êng-tu; 280 of his own concubines; 400,000 wives of his troops; everybody else in the province. *Destroyed.*—Every building in the province. *Burnt.*—Everything inflammable.

This programme appears to have been got through in about five years, 1644–1649. Many stories are current about this singular potentate; among others the following detail, not recounted by the historian, which occurred after the capture of Ch'êng-tu. By way of diverting his wife, to whom he seems to have been devotedly attached, he cut off the feet of the women who had been slaughtered and built three pagodas

with them. Unhappily his material was not quite sufficient to complete the third monument, and the artistic eye of his empress detected the lack of symmetry, whereupon the humorous monarch chopped off her feet and added them to the summit. Chang's hatred of the human race, and indeed of the whole animal kingdom of Ssŭ-ch'uan, is explained by the Chinese, not adequately, by his having inadvertently sat down upon a bed of nettles, a plant for which the province is famous. His whole story reads like an extravagant burlesque, but its general truth cannot be doubted. The Ssŭ-ch'uanese believe that very few of the natives survived, and when I protest that a good many must have been left, otherwise the Tartars, who are known to have slaughtered their hundreds of thousands, would have had nobody to massacre, they reply that the Tartars massacred the soldiers of Chang Hsien-chung. That devastator was the first of his army to fall by the Tartar arrow. He died a most heroic and glorious death, charging the whole Manchu host alone and almost unarmed.*

The present inhabitants of at any rate the southern part of the province are nearly all descendants of immigrants who came in under the present dynasty from the east. Most of them claim Hu-kuang as their fatherland, but near Jung-ch'ang Hsien I found a colony of immigrants from the Canton province, who profess to be able to speak Cantonese on occasion; but from their pronunciation of the numerals and a few other words it is clear that their progenitors were Hakkas. One of these colonists claimed my acquaintance on the ground that his cousin had visited England, but on examination it transpired that he had mistaken Shanghai for that country.

The market town of Yu-ting-p'u, reached by a steep approach 12 miles or so beyond Yung-ch'uan, deserves passing notice for the commercial importance of its central position between the three cities of Yung-ch'uan, Jung-ch'ang, and Ta-tsu Hsien. Its chief industry is the manufacture of agricultural implements from iron which is mined in its vicinity. The little town—for it deserves the name—is a good instance of the populousness of a province in which there are not a few villages rivalling the cities in extent and surpassing them in trade. So far as the country between Ch'ung-ch'ing and the capital is concerned, perhaps the most busy and peopled district is that which begins about this point and extends to the city of Tzu-chou; it is one of the least mountainous parts; it has good water communication by a commodious river and its affluents with Lu-chou, and consequently with the eastern provinces; and two specially important products, salt and grass-cloth, furnish staples for a thriving industry. Its agriculture, again, favoured by the comparative level, and in some degree by the exceptional possibility of irrigation from the river and its tributaries, is successful above the average, particularly in sugar. It is to the trade arising from these

* De Mailla, however, states that he was surprised during a reconnaissance.

sources that the existence of so many large villages is to be traced. Speaking broadly, the purely agricultural parts of Ssŭ-ch'uan are remarkable for the absence of villages properly so called. In the eastern provinces proprietors, tenants, and labourers, with a few shopkeepers and artisans, gather together, apparently for the sake of mutual protection, in an assemblage of houses surrounded by a mud wall, often at some distance from their fields. But in Ssŭ-ch'uan the farmer and his workpeople live, it may be said, invariably in farm-houses on their land, and the tendency is to the separation, rather than to the congregation, of dwellings. Thus when several sons divide an estate and their increasing families demand more house-room, they generally prefer to erect new houses on each separate inheritance, rather than, as in other provinces, to build close to the original family mansion, or to enlarge it. It thus results that the whole country is dotted over with cottages at a short distance from one another, picturesque and frequently spacious edifices composed of a strong timber frame filled up in the interstices with walls of stone below and mud above, and roofed evenly downwards from the ridge pole, with only a slight slope to broad eaves, which—without any upturn at the corners, such as the typical Chinese roof possesses—form a wide verandah. The resemblance which these dwellings bear to the old style of English houses has been noticed, I think, by Captain Blakiston, and, with the exception of the roof, which reminds one of a Swiss *châlet*, the similarity is striking in outward aspect; the wooden framework, black with seeming paint, shows out vividly on the whitewashed walls, and embowered as they generally are in a clump of greenery, the Ssŭ-ch'uan cottages convey a delusive impression of cleanliness, comfort, and neatness which it does not require a very close approach to dissipate. The hypothetical paint turns out to be grime, and the whitewash mostly efflorescence. Being, however, more spacious, they are probably more healthy than the crowded mud-huts of other provinces, and at any rate it must be an advantage to so filthy a people as the Chinese to live as far away from one another as possible.

Baron v. Richthofen, in drawing attention to this broadcast distribution of habitations, remarks that "people can live in this state of isolation and separation only where they expect peace, and profound peace is indeed the impression which Ssŭ-ch'uan prominently conveys." There is doubtless much truth in the observation; but the expectation of peace must have suffered many and grievous disappointments. Perhaps a more precise explanation is that the immigrants, refugees, and exiles—for tradition relates that people were sent in chains to colonise the province by K'ang-hsi—who came in from distant localities in the early days of the present dynasty, naturally built apart upon the lands which were allotted them, having in general few family ties which would induce them at the outset to build in communities, and, moreover, speaking

various dialects. No serious invasion occurred to modify this condition for nearly two centuries, until the Taiping outbreak made it necessary to unite for common safety. It is interesting to notice how this emergency was met by so scattered a population. They subscribed together and built stone walls round some convenient hill-top on which they took refuge at the approach of the rebels, leaving their lands and houses to be ravaged. But the separate system having now become established, it did not occur to them to build houses inside the walls; so that the fortifications remain uninhabited and isolated, and will doubtless so remain until the next invasion. They are very common on prominent heights, especially near the Yangtzŭ, and Captain Blakiston has indicated several of them on his chart under the name of "redoubts." The native name is *chai-tzu*, a word which has much the same meaning.

Another characteristic of the purely farm life, as distinguished from village life, of the agricultural population is the markets (*ch'ang*). These are generally long streets lining the main roads, consisting of shops owned by the farmers and let to traders on market-days, which fall on every third, fourth, or fifth day, as the case may be. These gatherings are the centres of news, gossip, official announcements, festivals, theatrical shows, and public, and even family meetings. If a bargain for the sale or renting of land has to be concluded, the matter is put off till market-day. If a marriage is to be negotiated by the heads of families, the high contracting parties go to market to draw up the preliminaries and to ratify the convention. All produce is disposed of at the same centre. The peddler, the barber, the blacksmith, and the tinker all repair thither, and it is there that the rustic makes his purchase of the longcloths and woollens of Europe and America. It will easily be understood that these fairs are very lively scenes on the days of meeting. They are indeed so thronged with traffickers and blocked with merchandise that it is difficult to make way through them.

A traveller ignorant of the system is exceedingly surprised to find, a few miles beyond so commercial a village, as it appears to him, another of equal or it may be of much greater extent utterly void of inhabitants. On inquiring the cause of its desertion he will be told that it is not market-day, and he will gradually come to understand that there are few villages in agricultural Ssŭ-ch'uan, but a great many market-places.

In manufacturing districts, however, the case is very different, and from Yu-ting-p'u forwards large villages are frequent.

On July 12th we passed through Jung-ch'ang Hsien. The public Examination Hall afforded us lodging during the breakfast hour. In a lumber-room behind the institution I discovered two wooden cannon which had evidently been discharged, though I was told that they were

loaded with gravel instead of shot. Each was seven feet long, the exterior diameter at the muzzle being about nine inches, and the bore four inches. They were circled with seven bands of hoop-iron less than one-eighth of an inch thick, the band round the muzzle being a little stouter, and, besides these, two strips of iron were laid in along the sides. From the muzzle to the vent, which was simply bored in the wood, measured about four feet, and the rear tapered away to a slightly curved tail. The whole affair weighed about 80 pounds. It was in the teeth of such war-engines that the Taipings, or their fellow marauders, got possession of the place.

The interior city seemed rather poor and dilapidated, but it contains a good many handsome shops. A large proportion of the citizens are of Cantonese descent. Starting again at 10 A.M. we passed through the suburb, more than a mile long, and suddenly came upon an affluent of the Lu-chou river. The stream is about 80 yards broad, with little current, and is crossed at the end of the suburb by a handsome stone bridge of six or seven arches, over which the high road passes. Instead of following it, however, we took boat and dropped down with the current some four or five miles, meeting a good deal of traffic, chiefly coal, bricks, and coffin-planks. But the principal industry of the place is grass-cloth (*ma-pu*), of which we noticed no small quantity laid out to bleach on the banks. Four miles or less from the city a ledge of rock, supporting a slab bridge of some forty arches, runs right across the stream, allowing exit to the water through one narrow opening between six and seven feet broad. All boats must, of course, be built by this inexorable measurement.

The thermometer here stood at 101° in the best shade I could find, but a more satisfactory exposure at 3 P.M. showed 98°. A child had died from the heat shortly before we arrived, its parents having brought it down to the river to cool it. Heat apoplexy, known in Ssŭ-ch'uan as *Lei ssu*, or death from exhaustion, is a common and well-known cause of death among the Chinese, and there is, in my poor opinion and experience, no reason to suppose that foreigners are more liable than natives to suffer from it. The latter, no doubt, resist exposure to the direct rays with greater impunity, but they are on the other hand less able to bear up against the weakening effects of a long period of exceptional heat, though relieved by the constant use of the fan and the habit of sleeping naked. The nightly attacks of musquitos are not a whit less formidable to the Chinaman than to the Englishman, and much severer cases of the inflammation known as prickly heat may be found among the Ssŭ-ch'uanese than among the European colonists of Hong Kong or Shanghai.

A native of Chekiang who was with us volunteered the information that in his province fatal cases of sunstroke are unknown, although people sometimes die of drinking cold water. In his opinion, the

Ssŭ-ch'uanese are more susceptible on account of the thinness of their skins.

Disembarking not far from the slab-bridge, we travelled five miles to the large village of Shao-chiu-fang, which owes its importance to a manufacture of pottery in terra-cotta introduced during the last six or seven years only. Our sole ambition was to make our way westward out of the heat, which rendered abhorrent all thought of visiting kilns and clay-works, but as we neared Li-shih-chên, another spacious and industrious village, 22 miles from our morning station, a cool breeze sprang up and depressed the thermometer to 86° at 9 P.M.

On July 13th a heavy fall of rain delayed our start until 8 A.M. Four miles brought us to Shih-yen-kai, a village lying on another small affluent of the Lu-chou river, crossed at this point by a stone bridge on piers which are carved to represent lions and elephants. The whole place resounded with the clang of smithies. I was told that the iron is not mined in the neighbourhood, but is brought from Lao-jên-shan, in the magistrature of Pi-shan, near Ch'ung-ch'ing. Five miles beyond Shih-yen-kai the affluent is again crossed at the gate of Lung-ch'ang, a Hsien city which is the centre of the grass-cloth (*ma-pu*) trade. There is a large export of this article to the eastern provinces, as it is both cheap and fashionable; but it is held much inferior to a similar fabric produced in Kiangsi, and is three or four times cheaper. The best quality I could obtain in the city cost me about sixpence a foot.

As far as Lung-ch'ang the road is excellent from a Chinese point of view, but beyond that it is in a very ruined and dislocated condition. Certainly no highway is so handsomely and expensively ornamented as this with stone portals (*p'ai-fang*). Most of them are erected by dutiful sons in honour of widowed mothers who have restrained themselves from contracting a second marriage. Perhaps the dread of a stepfather accounts in some degree for these pious dedications. Not a few commemorate the administrative virtues of some local official, but these are notoriously paid for in many cases by the official himself and by an interested claque. A third category is built in honour of centenarians, but these are as unauthentic as the others: a Chinaman's age increases very rapidly after seventy-five, and he becomes a hundred years old and upwards in about a decade. In a country where such passive virtues as widowhood, office-holding, and longevity are thus prominently distinguished, one would doubt whether more energetic civic qualities abound. However, the peculiarities of Chinese architecture and sculpture appear perhaps at their best in these monuments. The heavy curled roof is toned down, and the understructure is shapely and solid, so that they are mostly in very good preservation. With the exception of the human figures in relief, which, intentionally or not, all tend to the comic, the decorative details are pleasing. I noticed wall-spaces carved in imitation of basket-work with excellent effect, an idea suggested possibly by

the wattled walls of the poorer cottages or outhouses. All are built of stone; near Yung-ch'uan and Jung-ch'ang a dun-red sandstone predominates, and about Lung-ch'ang a warm and very agreeable cream-coloured variety. Inside the cities very ancient specimens, with the surface almost entirely peeled off, may be seen, and upon these the houses have gradually encroached, until they are now more than half built up. On the road, most of them are quite recent. The varying styles of p'ai-fang in different parts of China would make an interesting study, and it would be useful archæologically to discover and authenticate the earliest examples. It has been sought, without much justification, to connect them with the introduction of Buddhism; but I venture to think that they are nothing more than developments of the primitive monuments, of which the great triliths of Stonehenge are the type—two posts and a lintel. The Chinese have added a great deal of decoration, and an upper storey, and have protected the edifice with a roof; other modifications have inevitably ensued, according to the materials employed. Thus, in Peking, where wood is used in the construction, and beams of appropriate size are costly and rare, while tiles are easily made and greatly admired, the p'ai-fang is little more than a top-heavy roof perched on poles—a hideous object. In Yünnan Fu, pottery is largely introduced into the ornamentation, with a too gaudy and glaring result. But in Ssŭ-ch'uan the simplicity of the design is not sacrificed to details; colour is very seldom employed, and the whole structure is of stone; no roof is added to it, although the summit of the upper story often simulates a light roof and is carved to imitate tiles. That many of them are graceful and pleasing monuments may be accepted on the faith of Von Richthofen, who remarks:—"No traveller can help being struck with the great artistic perfection of the triumphal arches worked in red sandstone which abound in the country. . . . Some of them are masterpieces of Chinese art."

Two structures of characteristic style are met with throughout China, the pagoda and the p'ai-fang. The former, of which I shall have something to say further on, is probably of direct Indian origin, but with the exception of the remarkable Sanchi Tope, I do not know if there is any Indian exemplar of the p'ai-fang.* It seems to be peculiarly Chinese, and it may not be too credulous to expect that similar buildings or traces of them may be discovered in the ruined cities which are found, according to the reports of travellers, in the region beyond the north-west frontier, the supposed cradle of the Chinese family. If simplicity and grace at one end of a line, and grotesque degradation at the other, may be taken as showing the direction in which an artistic idea has travelled, the

* The *p'ai-fang* or *p'ai-lou* is the *toran* of India. Besides the stone examples at Sanchi another has since been found at Bharhut. The *toran* is represented in bas-reliefs (e. g. at Amaravati, see 'Tree and Serpent Worship,' 2nd. ed., pl. xcvi. fig. 3); and the thing itself, in its original timber form, is still used at Hindu weddings (see Fergusson, 'Ind. and Eastern Arch.,' p. 95; Cunningham's 'Stupa of Bharhut,' p. 8, and pl. iv.).—[H.Y.]

design of these portals must have been derived from a source which spread south-eastward across the provinces.

It would be a very interesting research to trace back the mention of the p'ai-fang to its earliest occurrence in Chinese literature. The second word of the compound seems to be used in an exceptional, or perhaps original, sense, and to mean mound.

Fourteen miles, more or less, beyond Jung-ch'ang we passed the village of Shuang-fêng-yi, where I was supposed to be the Roman Catholic Bishop of Ch'ung-ch'ing on his way to the capital, summoned thither by the Governor-General to answer for various crimes. On other occasions I was taken for a Miao-tzŭ chief, or a high dignitary of the Buddhist church. Captain Gill, I heard, had stopped near Lung-ch'ang to examine an exceptionally fine banyan, and with such baleful effect that, according to my informants, the tree fell down a few days after his departure. I have frequently been asked how many feet into the earth I could see. On the other hand, a Scotch missionary was accosted near Ch'êng-tu, and asked if it was true that all foreigners were blind. Native ignorance of anything extra-Chinese is so dense that it cannot be described; it can only be illustrated. I once stopped to inquire, in Chinese, of course, of two men who were hoeing a field, what was the purpose of a mound hard by. After listening with evident interest to my question, and without making any reply, one of them remarked to the other, "How much the language of these foreigners resembles ours!"

Eight miles further, we suddenly struck the main Lu-chou river, fully 200 yards broad, slow, shallow, and beset with sandbanks, and took boat at the busy little town of Pei-mu-chên, which may be considered the port of the city of Nei-chiang, some seven miles further on. Nei-chiang (meaning mid-river) lies near the neck of a peninsula, at the extremity of which, but on the other bank, Pei-mu-chên is built. Thus, after dropping a few miles down the stream, we landed, walked a few hundred yards, and again came upon the river at its upper curve. Just as we sighted the city, I observed near the bank a bamboo tube supported vertically 10 feet above the ground by a light scaffolding and stays of rope. Several low buildings surrounded the construction, and on entering I saw a strip of bamboo $1\frac{1}{2}$ inches broad by $\frac{1}{4}$ inch thick, issuing rapidly from the bowels of the earth through a hole, five inches broad, in a flagstone. The bamboo strip, joined to other strips by lashing, passed over a roller, and on following it into a shed, I found that it was being wound on a whim by a pair of buffaloes attached to the circumference. In a few minutes the connected strip, 260 feet long, had all issued from the hole, bringing up a bamboo pipe 50 feet long. When the bottom of the pipe rose clear of the ground a workman seized it, opened a valve in it, and several gallons of salt water shot out into a tub placed alongside. The end of the bamboo strip being fastened to the bottom of the pipe, or

bucket, as it may be called, could not of course support it vertically after it had cleared the mouth of the well from which it had brought up the brine; but it was kept erect by its top entering the stout tube, or guide, which had first caught my eye.

The buffaloes were then ungeared, the bucket dropped of itself at a great pace to the bottom of the well, where the brine pressed open the valve and again filled the bucket; the buffaloes were reattached and revolved in their orbit, and so the method of working brine-wells in Ssŭ-ch'uan was made clear.

The brine runs from the tub through pipes of the unfailing bamboo into pans, in which the salt is evaporated over coal-fires. The coal seemed very light, and is copiously watered to improve its effect. I could get nothing out of the valve-man, who was stone-deaf, and little more out of the buffalo-driver, in consequence of the noise of the revolving whim; but in the evening we found a merchant of Nei-chiang who owned a well at the great salt-works of Tzŭ-liu-ching, a long day's journey south-west of this, and who talked freely about his property and the method of working it. I need not repeat what Von Richthofen and Captain Gill have already written respecting the manner of boring the wells. The merchant bewailed the great expense he was put to for buffaloes; he keeps two hundred, costing about Tls. 40 (say 12*l.*) a head. The Tzŭ-liu-ching wells are worked at high pressure, the buffaloes being driven round at the best speed that can be got out of them. Only the most powerful beasts are suitable, and are fed at 300 cash (tenpence or a shilling) per diem. The buffalo suffers severely from the hot atmosphere and the unnatural haste; for although he can gallop at a good round pace under excitement, he is by nature a sober, sluggish animal, and is not happy without a cool bath twice a day. Consequently the poor beasts die off rapidly, and support a thriving trade in hides; much of the Ssŭ-ch'uan glue has the same origin.

Probably there is no Chinese industry to which steam-power could be applied with more immediate and obvious advantage than to the raising of brine from these wells. Those which I saw at Nei-chiang are not more than 300 feet deep, but at Tzŭ-liu-ching some are bored to more than 2000 feet. The gear which connects the revolving drum with the wheel over the well's mouth does not multiply speed, so that the buffaloes at each operation have to march or run the same distance as the depth of the well; hence they have to be driven fast to obtain a remunerative output, and "it is the pace that kills." Some adjustment by which they could pull harder, but travel slower, would be an advantage to all parties, but in any case the buffalo is very ill-suited to such work. The substitution of steam- for beef-power would not diminish the need for human labour; a man at the valve and another in the stable, with a boy to guide the buffaloes, are all that the present system requires for the mere raising of the brine, and as many, or more, would be employed if steam-

power were used, while the greatly increased outflow of brine would afford occupation for more hands in the evaporating shed. At Tzŭ-liu-ching the boilers could be heated by gas, the fuel by which the evaporation is now effected.

The boiling-pans are five or six inches thick, and weigh some 16 cwt. apiece; few of them last longer than a year, since the salt has to be evaporated to dryness, and the fire soon burns or cracks them. They are cast in various places, but chiefly in the neighbourhood of Lu-chou, and are not sold, but let, to the salt-workers, who, as the odd trade-technicality puts it, "buy the pan without the iron" ("Mai kuo, pu mai t'ieh"). When a pan is burnt through it reverts to the foundry proprietors, who recast and relet it. The hire under these conditions is forty or fifty taels, carriage expenses being borne by the hirer.

The Nei-chiang salt-production is comparatively unimportant, and there is no gas. The most noticeable industry of the district is perhaps sugar, the cultivation of which begins somewhere near this point, and follows the valley of the Lu-chou river down to the Yangtzŭ. On the latter stream the cane is grown thickly from P'ing-shan Hsien, the limiting point, to Ch'ung-ch'ing, or even further down. But the importance of Nei-chiang depends principally upon its advantageous river communication. Junks of large capacity easily ascend thus far with full cargoes of cotton, which is here disembarked and distributed over a wide district.

Our journey on the 15th led us through a most luxuriant valley to the city of Tzŭ-chou, still following the river and crossing it just before entering the city. At the ferry we poled out to a depth of 12 feet, and then took to our oars to cross the channel. Small steamers could in all probability reach this place at any season, but a long though not violent rapid, and a wide stretch of shingle-beds and reed-flats, do not afford good promise of a higher ascent unless during floods, when the water sometimes rises 20 feet above its mean level. Between the two cities the river is about 200 yards broad. Tzŭ-chou is about 24 miles from Nei-chiang; the pleasantest part of the stage is near Yin-shang-chên, a large village somewhat more than half-way, where the road, carried along a rock-terrace which overlooks the river, passes through groves of a well-kept and park-like appearance. This seemingly artificial neatness is frequently met with where Ssŭ-ch'uan roads cut through a steep hill-side.

Tzŭ-chou is a clean and substantially built town, possessing no special commercial significance. Beyond it we entered a district where no rain had fallen for forty days, except in a few light showers, although further south there had been an exceptionally copious fall. The crops were in a pitiful condition; millet seemed to suffer most, but the paddy, which, as it requires irrigation, one would expect to be the first to succumb, seemed capable of holding out longest of all, although the fields were as dry as

the sandstone road. Little or no work could be done, and the natives seemed to be keeping holiday: even in the smallest market-villages theatrical performances were being exhibited, gaudy processions wound among the slopes, and the parched fields were gay with banners; but this display was no merry-making: its purpose was to propitiate the spirits and to avert the calamity of famine. During the day's march I observed that about half the millet was dead, that the people were pulling up the maize, and that the cost of rice had risen in four days from eight cash a bowl to twelve cash; yet the country folk, though anxious, seemed by no means depressed, and I was told that even if the crops in this neighbourhood fail altogether, other parts of the province are sure to be productive, and there is no danger of starvation.

Ssŭ-ch'uan manners are easy and simple, and when no convenient roadside hostel was near and the breakfast hour approached, we used to enter the most commodious cottage, and spread our frugal meal there as a matter of course. Sometimes we took possession of an empty house, the family having gone to market or to the fields. We were generally received with a frank welcome, but the fear of officialdom is so strong that the arrival of my sedan-chair was apt to cause uneasiness, from a suspicion that I was a military commander with a tendency to make requisitions. In such circumstances, I would open conversation by inquiring how far it was to the nearest inn, and would find an opportunity of explaining indirectly that I had brought provisions with me and wanted nothing but fire and water; by which time my servant would have made some progress into the good graces of the inmates by a few unobtrusive salutations and compliments, and by purchasing half-a-dozen eggs or a fowl with the readiest money. By some such diplomacy we always gained free approach and fair accommodation. A good way is to pick up a guide (a small boy is preferable) before arriving at a village, and to treat him unusually and unexpectedly well. Another plan in doubtful cases is to make no show of being hungry, but to sit down and smoke, buying something casually and paying for it after a little bargaining, which has a good effect, and then on second thoughts conceiving the idea of breakfasting. Many such devices occur according to cases, but in general there is no difficulty in gaining the villagers' confidence. We breakfasted to-day among a bevy of countrywomen, wedded and single, who were engaged in spinning cotton, arranging the threads for the looms, of which two were in operation, and preparing the vermicelli called *kua-mien*. In one corner was a buffalo lazily turning a mill, and in another a labourer working a noisy winnowing box with a treadle. Three children, each about three years old, were enjoying the freedom of the floor and the society of the cocks and hens and a pig, and, though unweaned, took very kindly to the cakes we had brought from Ch'ung-ch'ing. Some children, by the way, are not weaned until the age of five years or more. Customers entered from time to time to buy the

kua-mien, our coolies came and went just as they pleased, our cooking was conducted in a corner, and beyond a few questions prompted by courtesy or curiosity, nothing interrupted our repast or the day's routine of the cottagers. All this went on in the same apartment, half room, half court, about 35 feet square. Suddenly the sound of a gong and a bell is heard outside, and everybody runs to the door, to see a procession of nearly naked youths carrying poles with some green plant tied to the tips, headed by the gong-man, who is a village elder, and a youngster with the bell. A standard-bearer with a gay paper banner brings up the rear of the procession, which marches sedately down the little street on its way to perambulate the droughty fields, in hope to induce the local genii to grant a fall of rain. The officials of the district are everywhere conducting the regulation rites for the same end, and as they will continue the ceremonies until the rain responds, they will persuade themselves that their entreaties have prevailed.

Pai Fo Ssŭ—"white Buddha shrine"—a temple 20 miles, or less, distant from Tzŭ-chou, received us for the night, and turned out to be a place of unusual interest. Vague accounts have from time to time been published of a Chinese sect who worship a deity called Tamo and regard the cross as a religious symbol, a story which has led the Roman Catholic missionaries to identify Tamo with St. Thomas, and to accept as proved the tradition that the Apostle made a voyage to China. On the other hand, the Tamo of Buddhism is, if I am not mistaken, a well-authenticated patriarch who came to China in the sixth century. It was,

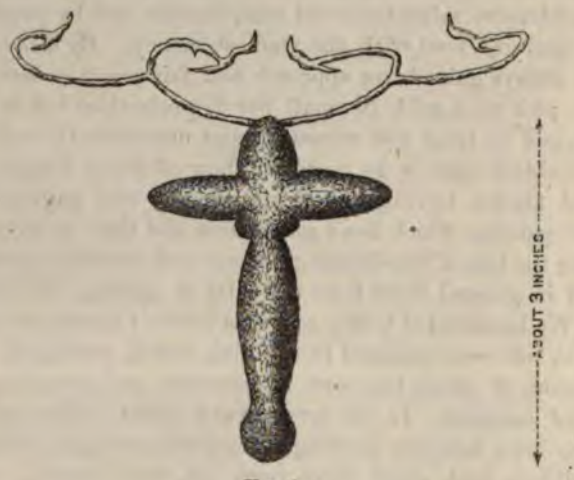



FIG. 1.

therefore, very curious to discover in this temple a graven image of the apostle, whether of Christianity or of Buddhism, depicting him with very marked Hindu features, a black complexion, and with a Latin

cross on his breast. I append a rough sketch (Fig. 1) of the symbol, which in the original is carved in relief and coloured red. Images of Tamo are numerous in Ssŭ-ch'uan temples, and he is nearly always—I think I may venture to say always—represented with black or very dark features. I have never heard of any other case of a cross being attached to his effigy.

The sketch (Fig. 2) represents a stone pillar, one of a large number of similar objects which are met with at the foot of the low hill on which the temple is built. They appear to have no connection with Tamo or the temple, but to belong to a separate cult. They are votive offerings dedicated to the tutelary genius of the spot, in recognition or in hope of a favourable response to prayers for fruitful marriage. Archæologists will probably see in them a widespread symbol of Nature-worship. They are composed of an upright stone pillar, from three to eight feet high, which transfixes a square slab, the whole being carved in sandstone. About thirty of them stand in couples in a confused clump on the roadside, all more or less chipped and fractured, and on the smooth face of a low sandstone cliff a great number—I counted more than two hundred—are seen carved in low relief, also in pairs. The bas-reliefs are of unknown antiquity, but some of the roadside pillars, though much dilapidated, seem comparatively recent. The votive purpose for which they are erected is familiar to the people of the neighbourhood. I was informed that they are called masts, or poles (*wei-kan*); but when I ventured to ask what connection exists between masts and a flourishing progeny, no one could explain the relation or, indeed, showed any interest in the subject.

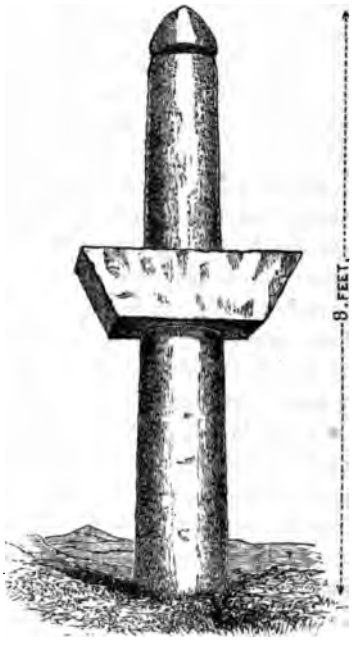


Fig. 2.

What is the meaning of the two masts which are set up beside the door of every official residence in China? They are generally assumed to be flagstaves, but I have never seen a flag exhibited, and they are unprovided with halliards. And what is the purpose of the transfixed piece which these poles carry? It is imagined to be a "top"—like the "main top" or "fore top"—but it has no such use, and is altogether too frail; moreover, there may be one, two, or three tops, according to the rank of the resident official, without any relation to the height or structure of the mast. The supposed top is named by the Chinese

*tou*, meaning a bushel, a measure of grain, where the allusion to fertility is obvious. Furthermore, I have seen cases where the mast is built up of stone. The official masts resemble the Pai-fo-ssŭ pillars in all respects except size, and the variations necessitated by their construction in wood. The cone on the mast-head survives, and the *tou* retains invariably the shape of the cross-slab in the sketch, but being made of wood is, for economy's sake, put together in open framework. The Chinese can explain neither the origin of these official poles nor their use, merely asserting that it is an immemorial custom to set them up outside public buildings.

Near the summit of the hill at the foot of which these sculptures are found I came upon several ancient tombs, of which all that the natives could tell me was that nobody knows anything about them. They are nearly covered by the present cultivation. Each construction contains half-a-dozen or more sepulchral chambers built side by side, and along the front runs a gallery on which they all enter. The whole system, including the gallery, is roofed, panelled, and floored with large stone slabs, perhaps six feet by three, though some are larger, put together with much accuracy and skill; the rock seems to have been first excavated, not as a foundation, but so to speak, as a receptacle, of which the slabs form the lining. The chambers are high enough for a man of average size to stand upright in (say five feet eight), and four or more broad, by some eight feet in length. The gallery is a little higher, and is entered with difficulty from the outside by low, square ports, which seem to have been originally closed. The tombs now contain nothing but a few human bones and fragments of pottery, which are as likely to be fresh as ancient, since modern beggars live and die in such places wherever the landlord's indulgence or negligence allows. Immediately outside the walls of Ch'ung-ch'ing there are many ruined tombs of a somewhat similar style, the latest bearing dates of the Ming dynasty.

On the 17th, after passing the market of Nan-ching-i, which is eight miles from the temple, we saw, four miles further on, what is a rare sight in China—a pagoda in course of construction. Five stages were already completed, reaching a height of 60 Chinese feet, the lowermost story being of stone and solid, i. e. without any hollow interior space, and having a base of 11 yards square. The second story, of brick, was octagonal externally and circular inside, the thinnest part of the wall measuring eight feet through. The third story was in the same style, but the fourth and remaining stages were octagonal inside and out, and the rest of the tower was to be completed on the same plan to a total height of 130 feet. A very frail segmental scaffolding outside enabled the builders to raise their materials, but access could also be gained by ladders placed inside. There seemed to be no scamping of work, and although the tower was to have been finished from foundation to spire

in six months, the bricklayers were proceeding very leisurely and intermittently with their business. The bricks were in course of manufacture in sheds below, and the stone had been quarried from the base of the hill. The estimated cost of the monument was given me by several independent informants at between thirty and forty thousand taels, equal to about 10,000*l.*, which, as the solid contents may be approximately calculated at about 50,000 cubic feet, gives the heavy rate of one pound sterling per five feet. But it is notorious that if these pagodas are built for any other purpose than the benign geomantic influence which they shed over the countryside, it is for the advantages which they bring to local committees of construction.

A population which subscribes for such costly and unproductive works must be fairly well-to-do; but, perhaps, a more convincing proof of affluence is found in the numerous bridges of the province, massive and even luxurious causeways, which would fully satisfy the sense of symmetry were it not for some defect in the curve of the arches. These appear at first sight circular, but on a nearer approach a tendency to a point is noticed, not decided enough to be pleasing, and yet quite sufficient to afflict the jaded traveller with the uneasy feeling that the architect was not sure whether his arch would turn out to be pointed or circular, and had left it to take its chance. The want of a prominent keystone increases the unpleasantness, the vertex being defined by the division between two voussoirs. These bridges are, however, very solidly and truly built, and are far superior to anything of the kind in Eastern China.

After a day's journey of some 17 miles, we once more crossed the Lu-chou river, and entered Tzŭ-yang Hsien. The channel is here about 150 yards broad, and admits junks of large size—say of sixty or seventy tons. The place has no special importance. Chien Chou, a larger city than any we had yet passed, about 24 miles farther, lies in a small plain on the river bank at the mouth of an affluent. Five minutes before reaching its gate we espied a temple of unusual appearance, and strolled into its court sure of finding something new or curious; but it turned out to be, not a temple, but a very ancient pagoda surrounded by low buildings. The pagodas with which Europeans are familiar are polygonal in plan, and generally built of stone; but in this province the older examples are square, and, what is singular in a country where stone is so extensively used, are of brick, coated with a durable white plaster, the well-known *chunam*. As one journeys across China the gradual change in style of these picturesque towers is very striking. In the typical pagoda of the south-eastern provinces the successive stages decrease both in height and diameter; but as the Ssŭ-ch'uan border is passed cases begin to occur in which the fifth or sixth stories are of the same breadth, or as it seems, of even a greater breadth, than the base, so that the outline of a side of the building, that is to say its profile,

resembles the arc of a bent bow when held with the string vertical. Still further west, as in the country we have reached, the old pagodas are square, and their upper stages are generally of very little height. In this Chien Chou pagoda each of the four faces are slightly concave; it is built of chunamed brick; the stories have imitation doors and round windows, and the cornices which divide story from story are not prominent, so that were it not for the suddenly pointed summit it might almost be taken for an English church-tower. It is very unlike the common idea of a pagoda, and yet it is a most authentic pagoda and a very old one, for high up on its eastern face, above a bas-relief of Buddha, is the inscription "Shih-kia-mu-ni Shê-li pao-t'a" (Buddha Shê-lî Pagoda). What is Shê-li? I appealed to the attendant priest, who is attached to the place, for information. "A Shê-li," he replied, "is a particle of the essence of Buddha, having no special shape, colour, or substance, but in general it is a minute speck resembling a morsel of crystal, and giving off intense light. Its size may however change infinitely, and it is impossible to set limits to it. An iron chest cannot confine it in the custody of unbelievers, and its radiance on occasion pierces everything, so that there is no concealing it." Much more such like definition was offered me, which might have been credible if one could have understood it. But I have a reminiscence which almost amounts to a sure recollection that Shê-li is a transliteration of some Sanscrit word meaning *relic;** in which case the inscription indicates that the pagoda contains a relic of Buddha, doubtless a particle of his ashes brought from India by a pilgrim. The extant journals of Fa-hsien, Hsüan-chuang, and others show that one purpose of their visits to India was to obtain relics (probably the term they employ is Shê-li, but I have no opportunity of examining any of their accounts); and here is a fairly authentic instance of the way in which they disposed of their collections.

Eight of the thirteen stories of this pagoda are ascended by an interior staircase, the walls of which are painted throughout with pictures of Buddhist saints and worthies, much in the style of the ruined Burmese temples at Pagán. The priest had no knowledge of the date of the building, and affirmed that there was no means of knowing it. I inquired somewhat deeply into this question, even sending to the prefect of the city to ask his opinion, but he replied that the date could not be ascertained. He himself evidently took no superficial interest in the antiquities of his jurisdiction, for he sent me a rubbing of an inscription which I met with on a singular object lying in the court below the pagoda.

* This is correct. The Sanskrit word is *sarira*, properly "the body," and used by the Buddhists for "relic" (see, for instance, Hardy's 'Eastern Monachism,' p. 212). Of the Sanskrit word the Chinese have made *she-li*, and the Tibetans *sharil*. The latter word occurs several times in Ssanang Ssetzen's 'Mongol Legends,' see Schmidt's transl., p. 249, &c.—[H. Y.]

It is not easy to describe it. Take a well-developed pear and cut it through its thickest part at right angles to its length; in other words cut off its top, then lay it, with the cut surface downwards, on a small book, but the book must be square. Assume the pear to be 2½ feet in diameter, and a little more in height, and to form with the book a solid mass of cast iron. Call this a "Shou-shan," or "Mount of Longevity." This forms the lower part of the machine. For the upper part imagine a coffee-cup without a handle, and solid, also of cast iron, two feet eight inches in diameter, with a spheroidal hollow in its base which fits on to the tail-end of the pear. Call this a "Fu-hai," or "Sea of Felicity." On the face of the coffee-cup, which, as I have said, is solid, as if it were full of coffee and the coffee frozen, are two oblong hollows, as if intended for the insertion of the ends of beams, and at one shorter side of each of these is an oval boss an inch or so in prominence. On the outside again, just below the rim of the cup, are eight shallow hollows which, if they were deeper, would give one the impression that they might have been meant for the insertion of capstan-bars; but although their edges are slightly raised no such supposition can be based on them, their depth not being more than two inches below the level of the circumference. The appended sketches (Figs. 3, 4, 5) will perhaps

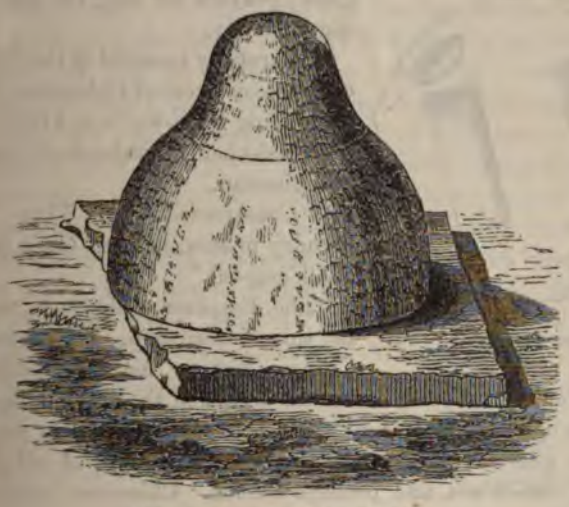


FIG. 3.—A MOUNT OF LONGEVITY.

assist this description. The two portions lie a few yards apart on the grass in the open court. The base is a good deal damaged. The upper piece bears in large characters the Buddhist formula "Continually turn the wheel of law for the calm repose of the universe," and on the lower piece is an inscription recording the names of the donors and the date of the mysterious implement, to the following effect:—

"Certain devout persons living in Little West Street in the Yang-an Magistracy, Chien-chou [here follow the names of the contributors] have given alms for the purpose of casting a Longæval Mount and

FIG. 4.—A SEA OF FELICITY.

Felicitous Sea for the temple [or temples] of Heavenly Calm and Everlasting Contemplation, so that the wheel may be turned and [two characters are here worn down and illegible] prayers for long life and flourishing posterity.

"Carefully recorded in the 12th month of the second year of Chien-yen, the cyclic term being Shên-wu [A.D. 1128].

"Hsi-kuang, head-priest, missionary, and Shaman.

"Constructed by Ying Chih-li, foundry master, of Han Chou (a quarter of Ch'êng-tu)."

FIG. 5.—PLAN OF THE FACE OF THE SEA OF FELICITY.

The Emperor Chien-yen, mentioned in this inscription, is renowned in Chinese history for his Buddhist proclivities. For several years before his accession the Golden Tartars had ravaged the northern provinces, and about, or a few years previous to, the date in question had made themselves masters of all Northern China *except Ssŭ-ch'uan*, and perhaps Shensi. Chien-yen only retained power over the country south of the Yangtse, establishing his court at Nanking, and subsequently in other neighbouring cities. The monument above described shows from the style of its date that the authority of the Golden Horde * was not yet acknowledged in Ssŭ-ch'uan, and thus supports the historical account. Ssŭ-ch'uan was finally conquered some

* *Golden Horde* is generally appropriated to the Mongol dynasty that reigned on the Volga; though the dynasty meant here, which reigned in North China before the Mongol rise, was called also *Kin* or "Golden."—[H. Y.]

130 years afterwards, probably not long before the visit of Marco Polo to the province, and, as usual, all the inhabitants of the capital were massacred.

The base also contains a modern, or at any rate a subsequent, inscription which, as it was getting dark, I could not decipher. The priest, on being consulted as to the use of the machine, told me that it was a pivot, and that on fitting a statue of Buddha to the orifices in its upper surface, and inserting spokes in the eight circumferential cavities, it will miraculously revolve of itself, and indicate the elect among the attendant worshippers. He admitted, however, that he knew very little about its adjustment, and I am disposed to believe him. The most probable solution seems to be that it formed the centre of a wheel, a materialisation of the Buddhist metaphor "wheel of the Law," or "Religion," more or less resembling the so-called praying machines common in Tibet. It must almost certainly have been a pivot, although it is very ill adapted mechanically for such a purpose, and moreover the boss shows no traces of striation. But then it may have been a failure, or no opportunity may have occurred for putting it in use.*

On leaving the city the road crossed an affluent of the Lu-chou river by a bridge 76 yards long, built partly on arches and partly on beams of the *nan-mu* tree. On the footway lie two trunks of this tree, intended for repairs, the larger being 48 feet long, 18 inches in diameter at the thin end, and 32 inches at the butt. The city is environed by fine temples and a most luxuriant cultivation, through which the river winds, 200 yards broad, but full of sand-banks and shoals. Nevertheless a good many large flat boats were coming down. Seventeen miles further the last belt of hills between Ch'ung-ch'ing and the capital has to be crossed. On the highest point of the road, at the foot of a tablet inscribed with the words "Here you are near heaven," I calculated the height above Ch'ung-ch'ing to be 2400 feet, or about 3200 feet above sea-level. The view from near this point is very extensive and striking, the broken country to the east, through part of which we had come, resembling a stormy sea, and the red colour of the soil and exposed rocks mingling in about equal proportion with the green of crops and groves; while on the west, some 1500 feet below, the great Ch'êng-tu plain stretches like a smooth lake and is everywhere covered

* There can be little doubt that the apparatus had been intended for a pivot, or part of the machinery of a revolving pagoda. Hwen T'sang obscurely describes such a revolving cupola over an image of Buddha in the valley of the Upper Oxus ('Pèlerins Boud.,' iv. p. 205). And the envoys of Shah Rukh to China (1420) describe a remarkable structure of the same kind at Kan-chau (in Kan-su Province). This was in the form of an octagonal kiosque fifteen stories high, made of wood and gilt; it revolved on a pivot (see 'Cathay and the Way Thither,' p. cciv.). It is possible that this was a colossal and elaborate form of prayer-cylinder. There is said to be such a cylinder in one of the Lama temples at Peking, which extends through the successive stories of the building to a height of some 70 feet (see A. Williamson, 'Journeys,' &c., ii. p. 346).—[H. Y.]

with a verdure which would be monotonous were it not for the variety of shades.

The plateau on this hill range, contrary to the general condition of Ssŭ-ch'uan plateaus, is but thinly inhabited, but the country near it on both sides teems with villages. The Ch'êng-tu plain, indeed, probably supports as close a population as the most crowded parts of the seaboard. Seven-tenths of the natives at least are of the poorest class, living from hand to mouth, and beggars abound. We had evidence of the difficulty of obtaining employment in the eagerness with which the people touted for the task of carrying my baggage. Out of their slender wage my coolies subhired temporary substitutes at the rate of two cash per *li*, or a penny for four miles. The poorest classes are of course at once affected by a drought, since no work can be done in a hard baked soil. To-day, however, the raggedest were gay, for a fall of rain had set in with good promise of duration. The simple folk sat under shelter and watched the downpour with delighted eyes and admiration of the skilful officials whose prayers had proved so irresistible. The theme of the weather is never tiresome here, but one must not speak disrespectfully of it; the public are warned by proclamation not to provoke the wrath of heaven by complaining of drought.

Ch'êng-tu, which we reached on the 20th, is about 15 miles from the foot of the range. Enough has been written about it by previous visitors to render any description of mine, superficial as it would be, unnecessary. To the traveller who could afford sufficient time to examine leisurely its antiquities and temples it would assuredly afford results of great interest. It is one of the largest of Chinese cities, having a circuit of about 12 miles, and although it contains a good many open spaces and temples with attached grounds, it may be considered well populated. The census of 1877 returned the number of families at about 70,000, and the total population at 330,000—190,000 being males and 140,000 females; but probably the extensive suburb was not included in the enumeration. Perhaps 350,000 would be a fair total estimate.* Its principal trade is in the numerous wild products of Tibet and Koko-nor—furs, rhubarb, musk, medicines, &c., which it purchases with the tea, silk, and cotton cloth of Ssŭ-ch'uan. All Tibetan countries are more or less directly administered or coerced from Ch'êng-tu by the Governor-General; and even distant Nepaul, known colloquially to the Ssŭ-ch'uanese as the country of the "Pi-pêng," sends a decennial mission of tribute, which is permitted or forbidden to proceed to Peking much at the Governor-General's discretion. It is no doubt owing to its proximity to the frontier that the

* For Ch'ung-ch'ing the result of the above-mentioned census was:—

| | |
|---|---|
| Total population .. .. .. .. .. .. .. | 120,676 |
| Males .. .. .. .. .. .. .. .. .. .. | 75,226 |
| Females .. .. .. .. .. .. .. .. .. .. | 45,450 |
| Number of families .. .. .. .. .. .. | 28,117 |

city is provided with a Tartar garrison, now become undistinguishable from the indigenous citizens. The fiction of a difference of language is, however, maintained, as may be noticed in the case of shop-signs, many of which are still written in Manchu. Ch'êng-tu claims an historical celebrity as having been the capital of the famous Liu-pei, and some vestiges of the palace which he built about 222 A.D. are said still to exist on the site of the present Examination Hall. The tradition that his palace occupied that spot is at any rate not open to reasonable doubt. The reputed tomb of his friend Chu-ko Liang, known otherwise as K'ung-ming—the most popular name in Western China, and the centre of many legends—lies somewhere outside the south wall.*

I had only time to visit one monument, but perhaps the most curious and the least known. A short distance from the North Gate, in the north-west quarter of the city, is an earthwork composed of two mounds some 40 feet high, and 50 feet broad at the top, distant from one another 120 feet, and connected by a lower terrace of about half the height and 70 feet broad. The whole work has the shape of a dumbbell half buried in the ground. Its direction is roughly north-west and south-east. On the south-eastern summit lies the singular object which I had been led to look for, and which had been described truly enough, though vaguely, as a large round white stone. It turned out to be a disc or cylinder of very hard limestone (silicate of lime) of enormous proportions, measuring approximately 18 feet in diameter. It seems to have slipped a few feet down the slope of the mound, and I cannot be altogether sure that its circle is complete, since more than half of it is hidden by superincumbent soil. Nor could I estimate its thickness, of which only 2½ feet are above ground. The surface of the monolith is a good deal worn and fractured, but the true circular form of the circumference is evident to the merest glance, as also is the perpendicularity of the rim to the face. The whole mass might probably be cleared of earth in an hour or two, but as the bystanders told me that any attempt to dig would cause the sky to darken and goblins to appear, I did not think it well to indulge a too intrusive curiosity. I could not find any indication of a similar object on the north-west mound, although analogy would lead one to suspect its presence, buried perhaps in the earth, as seems to have been the case with the extant stone. This huge grave-slab, for such it must almost certainly have been, is known locally as the Quern Stone (*Mo-p'an-shih*, meaning the bed-stone of a quern), and is said to have been brought from Han-chung Fu in Shensi. The mound is called Wu-t'ai Shan (Military Terrace Hill), and tradition makes it the burial-place of an emperor's son—what emperor I could not ascertain.† A Taot'ai of the

* At the temple called Wu-Hou-Tz'ŭ. See 'River of Golden Sand,' ii. p. 18.—[W. G.]

† The explanation given to me was that this was the grave of a concubine of the aboriginal king Shu-Wang, who lived in the third century. See 'River of Golden Sand,' ii. p. 17.—[W. G.]

city, to whom I applied for information, and who was engaged in re-editing the Topographical Account of Ssŭ-ch'uan, had never even heard of the Quern Stone. He was good enough to give me a printed plan of Ch'êng-tu, on which the mound is indicated, but he knew nothing of its builders or their purpose. From whatever quarry the stone was procured, it seems most likely that it was conveyed by water to near its present position, since it is a great deal broader than any road in the province.

## 2. Mount O.

On the 26th July we took ship outside the East Gate on a rapid narrow stream, apparently the city moat, which soon joins the main river a little below the An-shun Bridge, an antiquated wooden structure some 90 yards long. This is in all probability the bridge mentioned by Marco Polo. The too flattering description he gives of it leads one to suppose that the present handsome stone bridges of the province were unbuilt at the time of his journey.* The main river is a very disappointing waterway, about 80 yards broad in its wider reaches, but often narrowing to 50 yards or less, full of small rapids and shoals, and navigable only by the smallest junks. Our own bark drew at most a foot and a half of water, but in many places the channel drew less, causing us to stick fast repeatedly. The stream being swift—between five and six knots—and the numerous bridges, though generally well built, having uncomfortably small arches, the navigation is not devoid of danger. The luxuriant plain through which we were floating is thoroughly and easily irrigated by means of a modification of the machine known as the Persian wheel: a great quantity of water must be taken up in this way and spread over the country; but when all allowance is made for the diminution of the river, one cannot help surmising that Marco Polo must have felt reluctant to call it the Chiang Shui, or "Yangtzŭ waterway." He was, however, correct enough, as usual, for the Chinese consider it to be the main upper stream of the Yangtzŭ. It was pleasant in the glowing summer weather to glide down through the rich cultivation amid the hum of the huge water-wheels which met us at every turn, and to reflect that here at least is a country which can never suffer from drought. A garrulous coolie whom I had brought with me, for other purposes, however, than to criticise scenery, was loud in his admiration of a region which seemed to him an earthly paradise; and I was beginning to feel some of his enthusiasm, when the spectacle of a naked corpse, which two dogs were devouring on the towing-path, drew from him a burst of delighted laughter, and abashed all sympathy.

* One need not accept the supposition that Marco Polo described things so loosely and inaccurately. On this subject, and on the probability of great changes having taken place in the rivers about Ch'êng-tu, see the Introduction to Captain Gill's 'River of Golden Sand,' p. [37].—[H. Y.]

The limit of navigation for large junks is Su-ma-t'ou, a busy place in lat. 30° 28′ (by obs.). Twenty-five miles or so further down we passed Chiang-k'ou, a flourishing landing-place, at the junction with the river which runs down from Hsin-ching Hsien, some 20 miles away. This branch, locally called the Nan river, is beyond question a wider and deeper channel than that which we had been following, and should be regarded as the main river; but the waters of this plain are so intricately divided and subdivided, that their system is beyond comprehension. That the torrent which issues from the Kuan Hsien gorge should split up into an indefinite number of streams, and that these, after traversing the plain, should ultimately form two separate rivers flowing on different sides of a high range, namely, the Lu-chou river which we have coasted, and the Sui-fu river which we have now reached, would perhaps be credible if the plain were a dead flat, and its soil were an alluvium of considerable depth. But the streams have a swift current; those which I have seen are little below the level of the land; and further they are obstructed by frequent shingle-beds. At Su-ma-t'ou the shore is a thick layer of roller-stones, five to ten or more inches in longer diameter, so closely strewn that they make landing unpleasant. How comes it that this one extensive depression amid a wide ring of mountains should possess in its distribution of waters, and in no other particular, all the character of a delta? The only intelligible explanation seems to be that the distribution is produced artificially; but there is a conflict of authority on the question. Baron v. Richthofen describes the irrigation and drainage as natural,* while Captain Gill speaks of "ingenious irrigation works" at Kuan Hsien which direct the river "into the artificial channels by which the plain is watered." †

Chiang-k'ou is historically famous as the spot where the great rebel Wang-san-huai threw overboard vast quantities of treasure, the plunder of the province, and then burned his vessels, somewhere in the early part of the reign of Chia-ching. A few miles lower down we passed P'êng-shan Hsien, about which point the river widens out after the junction of all its subdivisions, and is called by foreigners the Min—a

* See p. 64 of his letter on Ssŭ-ch'uan.

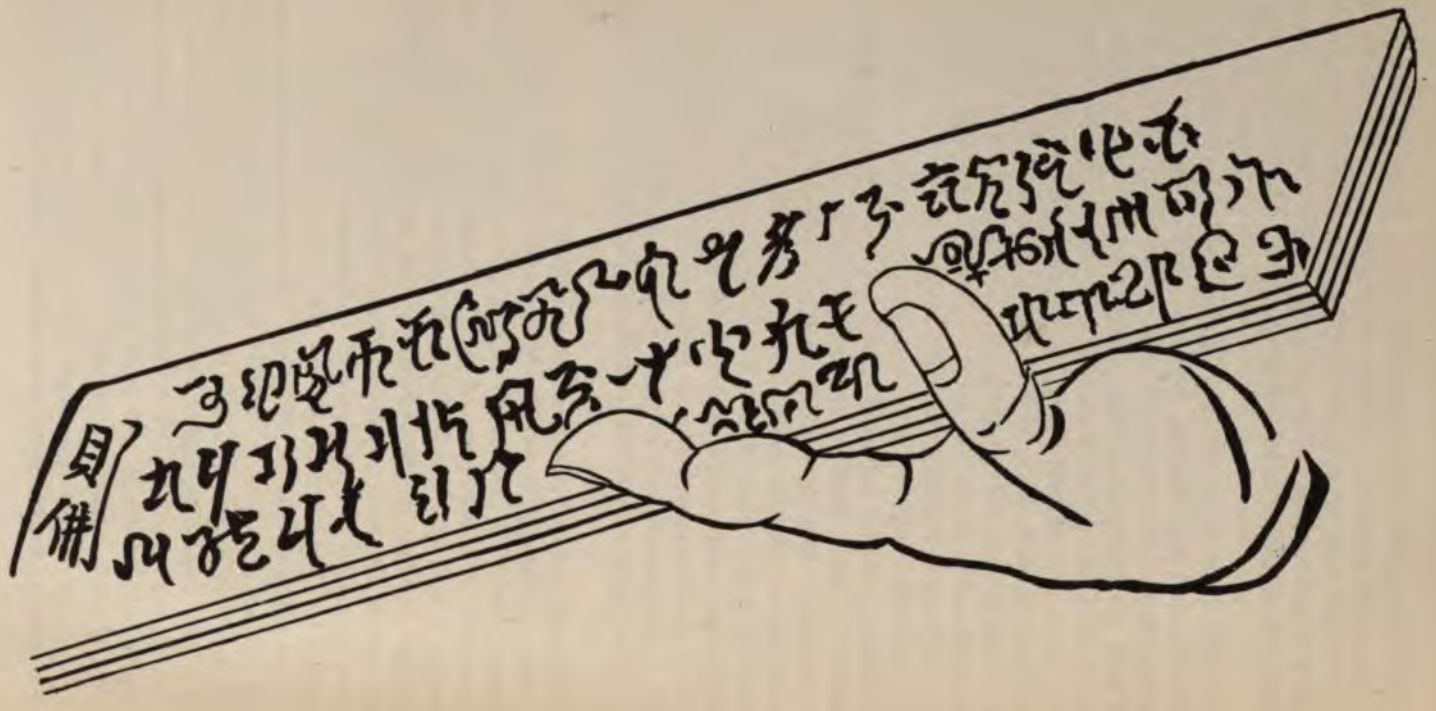
† The explanation of the phenomena is, I apprehend, to be sought in the "alluvial fan" (or convex delta) structure assumed by the débris spread by a stream which debouches suddenly from a mountain gorge into a flat valley, this structure being taken advantage of by the people to carry radiating channels of irrigation from the mouth of the gorge. "Thus the natural rivers of the country seem to have disappeared, or become merged in the number of artificial watercourses or canals, into which they have been distributed by the industry of the children of the soil. And instead of finding the streams diminishing in number and increasing in volume as we follow them downward, it is the reverse that takes place. There is complexity below and unity above." This is quoted from remarks of the lamented R. B. Shaw on the rivers of Kashgar, in 'Proceedings R. G. S.,' xx. p. 486. He refers to a paper by Mr. F. Drew on the subject, read before the Geological Society in August 1873.—[H. Y.]

name given to it probably by the Jesuit surveyors and perpetuated on subsequent maps, but quite unknown locally. As above remarked, the natives regard the river which we have been descending as the main stream of the Yangtzŭ; when they apply a distinctive name to it they call it the "Fu" river, after the three Fu cities of Ch'êng-tu, Chia-ting, and Sui-Fu (Sü-chou).

The plain begins to break up into hills a few miles below Mei-chou. Some hours before reaching that point my attention had been attracted to a dim but sharp-edged object rising high above the south-western horizon, which I took to be a cloud; but at last, noticing that its profile did not change, I pointed it out to a boatman, who replied with a certain contempt, "Don't you know Mount Omi when you see it?" From the point where I first caught sight of it, its distance was more than 50 miles. There must be something in the conditions of its position which greatly exaggerates its size, for when it is seen across the level country from the edge of which it rises, the mind at once refuses to believe that any mountain can be so high. How it looks from a nearer point of view I cannot affirm, for I have ascended it, travelled all round it, and three times passed close under it, without ever seeing it again, as it was always clothed in mist. Perhaps the mirage of the wide plain lends it an illusive majesty, which is enhanced by its remarkable outline. Its undulating ridge gradually rises to the summit at the southern end, where, from its highest knoll, it is suddenly cut sheer down to the level earth—or nearly so, for the lower fourth part was hidden by clouds—forming a precipice, or, it may be, a series of precipices, which it is disagreeable to think of.

We naturally made all haste to reach such an imposing prominence, and were glad to land at Chia-ting Fu on the 28th, after a journey—not counting stoppages—of twenty-six hours and forty-two minutes from the capital. The distance may be estimated at a little more than 100 miles. The country becomes hilly as the city is neared. What little river traffic we met consisted chiefly of coal and building materials. For more valuable goods it appears that the shorter and safer overland journey is preferred. The situation of Chia-ting at the junction of three large rivers, the Fu, Ya, and T'ung, in a district where wooded slopes contrast with bare cliffs, is very picturesque. Its population may be stated at about 25,000. A very considerable silk trade has its nominal headquarters in the city, but official exactions have in practice driven it to the large village of Su-ch'i, five miles westward, which has water communication by means of a fourth river, little more than a torrent, issuing from the flanks of Mount Omi. White wax and timber are the other principal exports of the city. It lies in exactly the same latitude as Ch'ung-ch'ing, viz. 29° 34′.

The road to Omi Hsien, 15 miles or so from Chia-ting, crosses the



broadest part of the valley of the Ya, and coasting along the right bank of the Omi river, approximately bisects the right angle formed by the confluence of the Ya and T'ung. It passes through the most luxuriant part of the country in which the famous white wax is produced. As I have described this cultivation in a previous paper, and the valley has been visited by former travellers, I will only mention here that its town of Chia-chiang lies in lat. 29° 44′ 20″ (I obtained no observation at Hung-ya), and that the head of the valley is at the market town of Lo-pa-ch'ang in lat. 29° 53′. The general run of the valley is north-west to south-east, but it is very tortuous above Hung-ya. The southern part, with its silk, white wax, and teeming rice-growth, so easily irrigated by the Persian wheels, may be fairly regarded as the richest nook of China. The little city of Omi, a square of a quarter of a mile on each side, is delightfully placed below the mountain spurs on the edge of a tract, sown with woods and seamed with torrents, which might be called park-like if nature had made it prim. It has a long suburb on the eastern side, and is thickly inhabited, a statement which I make authoritatively, since the whole population turned out to see me pass.

Near the point where the road from Omi city, for all the world like an English country-lane, enters the woods, we found lodging in the temple of Pao-ning-ssŭ. One of the sixteen patriarchs (Lo-han)* whose portraits surrounded my chamber, held in his hand an inscription, of which Plate I. is a careful copy.

On the 30th we travelled up by the bed of a torrent through woods which gradually thickened into forest, passing many a temple and shrine, until we reached the foot of a long series of stone stairs, and climbed to our breakfast halt in a monastery of forty monks—Fu-hu-ssŭ, the "tiger-taming temple." Its numberless halls and galleries, built entirely of timber, contain more than 800 statues of Buddhist saints and celebrities, none smaller than life, and several of colossal size, each having a separate individuality of lineaments, dress, and attributes, and an attitude which is not repeated. A Chinese artist was engaged in putting the finishing touches to a quadruple Buddha with thirty-two arms, standing about 12 feet high, beautifully executed in a very un-Chinese style. Above this a steep climb of 1400 feet, or thereabouts, leads up through pine groves interspersed with nan-mu trees, one of which I noticed 2½ feet in diameter, and more than 150 feet in height; the Ssŭ-ch'uan oak is also abundant. Nearly all the buildings which I saw on the lower slopes of Mount Omi, or O, as it is locally called for brevity's sake, are monasteries, and with the exception of monks, some 2000 in number, there are hardly any inhabitants but a few innkeepers. The land is church property. There is a certain

* This is the Chinese transformation of the Sanskrit *Arhan*, a Buddhist saint, in whom all worldly desire has become extinct.—[H. Y.]

cultivation in small clearings, but generally speaking the whole mountain is covered with forest.

We had thus far, however, only climbed a spur of the sacred mount, and had to undo much of our work by descending again into a deep glen. A broad torrent is here divided by a precipitous island-rock, which is crowned by a temple and connected with both banks by bridges; its crest thickly wooded; its vertical sides bare except where they are festooned with creeping plants; the bottom of the twin abyss filled with seething foam; a spot where a hermit might abide, and a traveller may well linger. Near this point a few stalls are met with, on which the productions of Mount O are exposed for sale to pilgrims. They are more curious than valuable—a kind of ginseng called *o-sêng*, various sorts of tea produced in the vicinity, quartz crystals found in the rocks, carved staves for the support of weary pilgrims, and a kind of cicada with a long fungus growing out of its head. Close to this emporium, a beggar sitting by the roadside, with his back propped against a tree, attracted my notice by the extraordinary size and shape of what I took to be his ears, but which turned out to be the soles of his feet. His thighs and legs ran up behind his back, so that his feet were placed, with the soles in front, between his ears and eyes; a most unpleasant specimen, which I did not care to investigate.

We had now attained the foot of the central mountain, the ascent of which is made painful rather than easy by the stone steps which have been laid down for the benefit of pilgrims; but there are many gradients which it would be impossible to climb without them. The mist thickened round us as our caravan plodded heavily up the devious stairs, with a primeval forest for balustrade, and when we asked an athletic monk, who outstripped us with great ease, how far it was to Wan-nien-ssŭ, our resting-place, it seemed unkind of him to reply "Fifteen miles for you and five for me." We made Wan-nien-ssŭ (Myriad Years Monastery) early in the evening, and in the clump of temples of which it is the centre found much instruction and amusement.

Just below it, in a kind of hostel, is a statue of Buddha twenty-fi[ve] or more feet high, of a very rude and archaic style, reputed to be th[e] oldest idol on the mountain. It is said to be bronze, but I took it [to] be pure copper. Nothing could be learned of its age. A more artistic w[ork] is found in a temple behind Wan-nien-ssŭ, in a separate shrine. Pass[ing] under a dark archway we entered a hall in the middle of which, as [well] as we could see through the dim religious light, we observed a kind [of] palisade [sur]rounding it and [co]nsisting of magnificent bronze, or [per]haps such [pil]lars, [ar]ranged [in] [a] [cir]cle. The surface is of [a] [dar]k bl[ue] [col]our, and [I] was able to judge [of] [the] [ma]terial [by] [the] [ed]ges [of] [the] [ba]ses [of] [the] [pil]lars, which [ap]peared to be [of] [the] [same] [ma]terial as that of [the] [ca]sting [of] [the] [ca]ldron [in] [the] [ha]ll [of] [the] [Ten] [Thousand] [Buddhas].

12 feet high; its peculiarities are that it is somewhat too bulky, that the trunk seems rather too long, and that it has six tusks, three on each side. With these exceptions, if exception can be taken, the modelling is excellent, and a glance shows that the artist must have studied from life, for the folds of skin on various parts of the body, and the details of the trunk, are rendered with great truth and success, though with a certain conventionalism. The creature has been cast in three sections, belly and legs forming the lower, and back the uppermost. The contour of the belly is complete, but on stooping underneath one sees that it is hollow and that the exposed edges are about five inches thick; in other parts the metal is a great deal thicker. Each of his feet stands on a bronze lotus, and on his back the mammoth bears in place of a howda another huge lotus-flower, in which is enthroned an admirable image of Buddha, cast, I was told, in the same metal, but thickly gilt, his crown of glory towering to a height of 33 feet above the floor. Though generally called a Buddha, the image represents P'u-hsien P'u-sa (Samantabhadra Bodhisattva), the saint who is the patron or patroness, for the Chinese credit him with female permutations, of Mount O. The monks told me that P'u-hsien descended upon the mountain in the form of an elephant, and that the casting commemorates the manifestation. But it may more probably bear an allusion to the well-known vision in which the mother of Buddha saw before his birth a white elephant with six tusks.

The fane which encloses the casting is not less curious, being a hollow cube, covered with a hemisphere, and roofed with a pyramid. The walls of the cube are twelve feet thick, and the floor of the interior is a square of 33 feet on each side. The square becomes modified into a circle as the courses rise, by a transition which is gradual and pleasing but impossible to describe clearly without a knowledge of technical terms. Speaking clumsily, the four walls each terminate in a semicircular outline, the summit of each semicircle touching the circumference—i. e. the base—of the dome, and the four corners are each filled with three masses of brickwork, the surface outline of the central mass being an oval pointed at both ends, and the two others spherical triangles. The faces of all three are concave. The circumference of the dome is thus evolved from a square without any awkward abruptness, and it is only on trying to describe it geometrically that the arrangement begins to appear puzzling. To the eye the architectural process of squaring the circle is perfectly simple. The dome however springs from a rim which stands a little back from the circle thus formed, and so gains a few additional feet of diameter and increased lightness of appearance. The vault is to all appearance a hemisphere, very smoothly and exactly constructed. The whole edifice is of brick except, I think, a few insertions of stone blocks in the lower courses. The walls contain a series of ledges on which are placed a number of small images said to be of silver. The only light

which enters is admitted by the two arched doorways, before and behind the elephant.

The outside of the shrine cannot be seen, as it is enclosed in a timber building, which entirely covers it. Clambering by means of this envelope on to the roof, I found, instead of a cupola, a confused heap of brickbats, the debris of a low four-sided pyramid which seems to have been faced with porcelain tiles. The timber casing was absurdly added by the monks to protect the dome from the weight of the winter snow, a fair indication that the shrine was not built by Chinese. So solid a building would probably stand fast even if the whole mountain were upset on to it. The precaution has gone far to defeat its own purpose, for the wooden husk has been twice burnt to ashes, damaging not only the roof but the tusks of the elephant as well. It is said that they were melted off by the intense heat. The present tusks are a feeble restoration built up of plates and bands.

With respect to the age and origin of the shrine and its contents, the most authentic information is found in the Ssŭ-ch'uan Topography to the following effect. "The monastery of 'Clear Water P'u-hsien' on Mount Omi, the ancient monastery where (the patriarch) P'u served Buddha, dates from the Chin dynasty (A.D. 265–313). During the T'ang dynasty Hui-t'ung made his hermitage there. It was named 'Clear Water P'u-hsien Monastery' under the Sungs; Wan-li, of the Mings, changed its style to 'Saintly longevity of a myriad years.' The 'Hall of Great O' stood in front, facing which was the 'monument of Illustrious Patriarchs of the South,' and on the left the 'monument of Sylvan Repose.' The buildings included a series of seven shrines, the first of which contained a 'P'i-lu,' the second seven Buddhas, the third a Deva king, the fourth a guardian deity (Chin-kang), and the fifth a great Buddha; the sixth was *a revolving spiral constructed of brick, enclosing a gilded bronze image of P'u-hsien, sixteen feet high, mounted on an elephant.* In the beginning of the Sung dynasty (A.D. 960) orders were given to set up a bronze shrine and a bronze image also more than 100 feet high. Under Wan-li, the Empress-mother directed the shrine of P'u-hsien, namely, the spirally constructed brick edifice, to be carefully and thoroughly restored, and had the elephant gilt."

The existing building is obviously the "revolving spiral" here mentioned, and the awkwardness of the term, which conveys no idea to a Chinaman, is another proof that the builders were not Chinese. A name has had to be invented for an exotic form of construction, and there is, so far as I am aware, no other instance of a true dome of brick or masonry in China. It seems safe to conclude that the builders of the P'u-hsien shrine, as well as the artist who designed the castings, were Indian Buddhists.*

* In the name "revolving spiral" we seem to have another allusion to such structures as are mentioned in the note at p. 25. In the present case there may have been some

With reference to the patriarch P'u (a religious name which means contemplation), I made inquiries of a learned abbot in Ch'ung-ch'ing; but beyond ascertaining that he lived in the early time of the Chin dynasty, and is an historical personage, I only elicited the unsatisfying statement that "the joy of religion was his mistress, the knowledge of salvation his estate; grace and mercy were his treasures, and charity his vocation. To ask his lay name or his habitation is not permitted."

Hui-t'ung (also a religious name), is said to have flourished during the reigns of the three T'ang emperors Wen-tsung, Wu-tsung, and Hsüan-tsung (A.D. 827–860). The second of these monarchs is the famous iconoclast who melted down all the bronze idols he could lay hold of, and turned the metal into currency. Hui-t'ung, it appears, had influence to save a certain number; but the reason why the elephant was spared is not far to seek. So intractable a mass of bronze could not well be melted whole nor broken up, unless at a cost which would outweigh its intrinsic value.

It does not seem likely that the "great Buddha" alluded to in the above citation, is the bronze (or copper) colossus which now stands in a hostel a few hundred yards from the Wan-nien-ssŭ. If the "great Buddha" had been of bronze the fact would have been mentioned. It may be that the extant statue is all that remains of the "bronze shrine and bronze image *also* more than a hundred feet high." The word "also" has no correlative in the text, but the passage is an extract from some previous work, and the implied reference may well have disappeared in the process of compilation. The height of 100 feet may be taken as applying to the shrine, and perhaps a pagoda-like spire. The existing Buddha is, as I have said, about 25 feet high, and as compared with the elephant is a distressingly feeble conception. The latter, though more severe in style than modern realism is pleased to admire, cannot be refused the praise of excellence, and I am not indulging the fondness of a discoverer in asserting that it would not disgrace a reputable artist of any school or epoch. The only defect I could discover in the mechanical work is that the three stages of the casting are not quite accurately closed together. China is reproached with its lack of ancient monuments, and one may be pardoned a certain self-gratulation upon the discovery of what may be considered, next to the Great Wall, the oldest Chinese building of fairly authentic antiquity, containing the most ancient bronze casting of any great size in existence. It

wooden structure, formerly pivoted in the dome, that revolved. The suggestion of Hindu builders does not help to solve the puzzle of the dome. The description of the square building, with pendentives and circular dome, rather suggests work like that of the Indian Mahommedans of the Deccan in the sixteenth century. (See Fergusson's 'Indian and Eastern Architecture,' p. 560 *seq.*) But place and date are far apart from these, and I commend this very remarkable account to Mr. Fergusson's own consideration. —[H. Y.]

is not every day that a tourist stumbles upon a handsome monument fifteen centuries old.

Before I had done wondering at the brazen monster, and the dome which shields his resplendent rider, a monk who was standing by said confidentially, "Come with me, and I will show you a stranger sight; would you like to see a real tooth of Sakya-muni Buddha?" "Very much, indeed," I replied; and he took me down an imposing flight of steps to a temple near the copper colossus, informing me on the way that Buddha had only four teeth, all of which are extant. I followed my guide into a hall chock-full of gods of brass and clay, and in a few moments the sacred tooth was extracted from a wooden box and put into my hands. I estimated its weight at about 20 pounds, but the priests who gathered round told me that the exact weight is 13½ catties, or 18 English pounds. It is about a foot long, and of a rudely triangular outline: the grinding surface is level, but not smooth, and contains layers of transparent enamel. It is evidently a tooth, and may probably have been the molar of an elephant, or of some cognate beast. Emboldened by the tolerance of the priests, who had no fanatical objection to its minute examination, I borrowed a razor from them and attempted to cut the surface of the relic, but I could make no impression upon the dense fossil ivory. They told me that it had been presented by a Chinese emperor, who gave a similar tooth to a monastery on Wu-t'ai-shan. I protested to the priests that it was an elephant's molar,* but they scouted the idea, affirming that they were well acquainted with the shape of elephants' teeth, which, they said, are "long things like horns sticking out of their mouths." "But," I again objected, "if this was one of Sakya-muni's teeth, and he was reasonably well proportioned, he must have been 140 feet high." "How do you know he wasn't?" they asked; "and how do you know if the tooth hasn't grown since he entered Nirvana?"† Such faith, defended by such dialectics, is inexpugnable, and I withdrew from the controversy.

Wan-nien-ssŭ is 3500 feet above sea-level. We left it on the 31st, and mounted, through rain and fog, up and down—for the path is by no means a continuous ascent—to the temple of Hsi-hsiang-ch'ih. On the morrow we were stopped by heavy rain after three hours' marching of the severest kind, and compelled to spend the day in Chieh-yin-tien, at which point we had reached an elevation of 9000 feet. Nothing was visible through the thick mist during the two days, but the lower parts of the forest trunks and the interminable stairs.

* Mr. Fortune has given a cut of a Buddha's tooth at Fu-chau, which is evidently an elephant's molar. It is copied in 'Marco Polo,' Bk. iii. ch. xv.—[H. Y.]

† The following occurs in my diary written before I had seen Mr. Baber's paper:—"Mashhad, 2nd Feb., 1881.—A man came with curiosities for sale, amongst others an elephant's grinder tooth; the owner declared it was several thousand years old, and was the tooth of an antediluvian man. I asked him how many farsakhs tall that man was."—[W. G.]

We visited several temples, discovering among other curiosities a sleeping Buddha of a very realistic nature; a nude figure lying in a genuine bed, with real blankets, mattress, and pillows complete. In another place two mummies—called by the priests *jou-shên* or "flesh idols"—were shown us as the mortal remains of a pair of saints, set up like ordinary Buddhist images, and very much resembling them. An inspection of the damaged ends of their fingers showed a great many folds of silk bandage surrounding a central core, which was not, however, quite laid bare. There is no reason to doubt their authenticity, though their shrunken faces, which are exposed, are so lacquered and "made up" as to have lost all human semblance.

The abbot of Chieh-yin-tien turned out to be a very intelligent ecclesiastic, and much better instructed in Buddhism than most of his cloth. He had travelled far and wide in Northern China, had often taken a passage on steamers, and was much interested in the subject of locomotive engines since a recent visit to Shanghai and an excursion on the Wusung Railway. His mind had been enlarged by these journeys to foreign parts, and he allowed me to kill a fowl which I had brought with me, probably the first tame bird which had ascended the mountain for ten centuries. All eating of flesh or taking of life is, of course, forbidden by strict Buddhist discipline. Here the severest monastic rules are imposed; even eggs are contraband; but the abbot made no difficulty, and even met me more than half-way. We sat long into the night round the wood fire, baking and eating the fine potatoes which are grown on the shoulders of the mountain, and listening to his remarkable stories.

"Wu-t'ai Shan," he said, "is the most ancient holy place in China, and contains a statue which stood there before Buddhism was preached. But Mount O is more strange and wonderful. Often during the ascent of the mountain have pilgrims been beguiled by the chant of invocations, and the pleasant tolling of bells in lone spots where no monastery lies, and straying from the road towards such sounds, have lost their way. On a sudden they have descried in the thickest part of the forest immense halls in which images of purest gold are seated on jewelled thrones; there they have been daintily fed and delicately lodged by ministering priests, and guided on the morrow back to the main path, but never after their return from the Golden Summit have they been able to find the mysterious abode of their hosts. Sometimes a pilgrim strays into the mouth of a cave from which issues a gleam of no earthly splendour; and lighted by the ray mile after mile without fatigue through stupendous chambers of which he never divulges the unutterable secrets, he at length falls asleep, to awake on the top of O, gazing on the Glory of Buddha. The Glory of Buddha," said the abbot, "is unknown to you, but you may see it when you reach the Golden Summit.

"You do not seem to believe all this. Well, you are not bound to believe it. I believe it myself. You ask me about the Wilderness (Lao-lin) behind the mountain. People will tell you much which is not true. It is partly inhabited by charcoal-burners, potash-burners, wood-cutters, and miners of copper and iron. There are two mountains in it, Mount Wa and Mount Wa-wu, as high as Mount O, but with precipices on every side, so that they can only be ascended by means of ladders, and only in the summer months; in other seasons the falling icicles make the ascent impossible. Both have lakes on the summit. The Wilderness abounds in tigers, white bears, wolves, foxes, monkeys, musk-deer, and wild oxen. Eight years ago I saw a tiger as big as a cow on a rock outside the door. Afraid! No, I was not afraid. Why should a poor monk be afraid of a tiger? The wild oxen are much like common cattle, but shorter in the body and far more active. Those I saw near Mount Wa-wu had long black hair, but generally they are the same colour as domesticated cattle. It is not easy to find them, and they are so savage that people fear to hunt them."

What he told us about the two mountains is fairly true, for I have since caught a distant glimpse of Mount Wa-wu, and ascended Mount Wa, a most singular formation resembling a square tower.* All its four sides are very slightly out of the perpendicular for a height of about

* The upper story of this most imposing mountain is a series of twelve or fourteen precipices rising one above another, each not much less than 200 feet high, and receding very slightly on all four sides from the one next below it. Every individual precipice is regularly continued all round the four sides. Or it may be considered as a flight of thirteen steps, each 180 feet high and 30 feet broad. Or again, it may be described as thirteen layers of square, or slightly oblong, limestone slabs, 180 feet thick, and about a mile on each side, piled with careful regularity and exact levelling upon a base 8000 feet high. Or, perhaps, it may be compared to a cubic crystal, stuck amid a row of irregular gems. Or, perhaps, it is beyond compare. Some day the tourist will go there and compose "fine English"; he could not choose a better place for a bad purpose; but if he is wiser than his kind, he will look and wonder, and say little, and pass on.

The plateau on the top, undulating so slightly that it may be called flat, is a grove of evergreens with a few open glades—the most charming park in the world. The rhododendrons begin 3000 feet below, but perhaps attain their fullest exuberance on the summit. The lake is a marsh, and at least two brooks meander among the knolls. It is not very necessary to add that in perfectly clear weather the unassisted vision extends, on all four sides, to a greater distance than 60 yards—the fog limit of our prospect during the twenty-four hours we spent on the mountain.

At the north-west angle a natural buttress crowned by a pinnacle, not easily discernible from below, offers, though grudgingly, a safe but very narrow and sinuous way to within a thousand feet or so of the summit. Above this, following a track which takes advantage of the accidents of a corner, we wandered among broken cliffs, honeycombed with grottoes and irregular cavities, climbed the rungs of a long wooden ladder, hid ourselves from the rain in crannies and crevices, the sockets of icicles as big as church steeple,—of course there were no icicles in June, but I saw them in March, and heard them fall and remember it—climbed another ladder, followed a level ridge, climbed three more decrepit ladders and several more honeycombed steeps, lost all reckoning, and suddenly struck a gravel path which led us so easily into the park, that if it had not been for the fog we should have forgotten that we were in the clouds.

2500 feet. The abbot's tiger was probably a leopard, a beast which is common in Western China. Musk-deer, foxes, and bears I have seen, but the latter were black, and after a good deal of inquiry I concluded that the white bears are black, with a white spot on the breast.* A special interest attaches to the wild oxen, since they are unknown in any other part of China proper. From a Lolo chief and his followers, most enthusiastic hunters, I afterwards learnt that the cattle are met with in herds of from seven to twenty head in the recesses of the Wilderness, which may be defined as the region between the T'ung river and Ya-chou, but that in general they are rarely seen. There is, however, a certain salt spring a day's journey or more north of Ta-t'ien-ch'ih to which they repair in early summer, and where they may infallibly be found some time in June. The Lolos, hardy and athletic mountaineers though they be, are evidently fearful of molesting the hill cattle—*ngai-niu* in local Chinese. For such sport their weapons and hounds are miserably inefficient. The hounds, a species of thick-built terrier, rough haired and mostly black, with straight legs, a coarse tail and muzzle, erect ears, tan eyebrows, and about 20 inches of height, though very useful for tracking and rousing game, will not face a beast at bay. The Lolos carry a pike, and a quiver of poisoned arrows only nine or ten inches long, which they discharge from a powerful bow made of the wild mulberry. During the four or five days when a band of them, and a pack of a dozen dogs, were living with me, they made continual hunting excursions, and I gathered from their accounts that only a very courageous hound would approach a bear. One evening after their return from the hills they brought me a dog with a wound in his shoulder, saying that a bear had struck him and that the claw had remained stuck in the wound; but when after much difficulty we drew out the supposed claw, it proved to be the quill of a porcupine. A bear had, however, been brought to bay, and my guests admitted that they did not care to attack him. The wild oxen are considered far more formidable game than the bears; they hunt their hunters, and are said to be astonishingly agile; but no doubt some allowance must be made for the feeble weapons of the Lolos. A rude pike is not a likely instrument with which to slaughter a wild bull on the steep slope of a jungle-covered hill, and their arrows are so short that they can only be used at close quarters. Moreover, they carry their poison in a little bag and do not apply it to the arrow tips until the time for action arrives, a habit which must cause hurry and confusion, and be greatly in favour of the bull. The most successful mode of killing the cattle is by planting three pikes in a narrow run frequented by them, in such a manner that they may impale themselves on the points. Another way, which I could not quite understand, is to approach them with a large number of

* See 'Journal de mon troisième Voyage en China,' Armand David, iii. p. 328, where four kinds of bears are spoken of, one greyish (de couleurs grisâtres).—[W. G.]

dogs and men, to separate one from a herd, and to drive him over a precipice.

I was lucky enough to obtain a pair of horns and part of the hide of one of these redoubtable animals, which seem to show that they are a kind of bison. I do not remember if it is in speaking of this neighbourhood that Marco Polo mentions his "Beyamini"; but if the cattle should turn out to be a new species, *Bos Beyamini* would be a good name.*

It is an easy walk from Chieh-yin-tien to the summit, although a formidable staircase of 400 or 500 feet is encountered at the outset. About this point the pines attain their greatest size. We saw several which divided into two trunks at a few feet above the ground, and which are said to yield the best timber. The path grows easy at about 10,000 feet, where a great variety of flowering plants and ferns line its border. Above that elevation the pines begin to fall off, but the slopes are still well wooded with smaller kinds. Thick beds of weeds are passed, a plentiful growth of large thistles is remarked, then comes a potato-field, and we issue on to the highest point of O, known as the "Golden Summit."

The comparatively level space on the top—about an acre—is so holy that our company reached it in a high state of exaltation. The first object to be examined was a bronze temple of such excessive sanctity that it has been struck by lightning innumerable times. I had been led to suppose that it was still standing, the last of a long line of metallic buildings which had been successively demolished by thunderbolts; but I only found its ruins. The last thunder-bolt had fallen in 1819, since which event it had not been restored. The theory that a lightning stroke proves the sacred character of an edifice may perhaps be a Buddhist importation; the opinion of the Chinese is just the contrary. According to them a person killed by lightning must have been a monster of impiety. They hold, however, that any smooth and bright surface attracts a stroke, and they therefore jump to the conclusion that all creatures with glistening bellies, such as the frogs and eels (or edible snakes) which abound in Ssŭ-ch'uan rice-fields, turn upon their backs by a kind of natural affinity during a thunder-storm, and so attract the flash. Such, at any rate, was the conviction of the priest who showed us the ruins. The masses of metal at present lying in a heap on the summit consist of pillars, beams, panels, and tiles, all of fine bronze. The pillars are nine feet long and eight inches in diameter, the

* It is quite in this region that Marco locates the oxen called *Beyamini*—"very wild and fierce animals." I have supposed the word to be probably a misunderstanding of the amanuensis for *Buemini*, i. e. Bohemian, and that the traveller was comparing them to the German or Bohemian *urus*. It is not possible to say from what is stated here what the species is, but probably it is a *gavæus*, of which Jerdan describes three species (see 'Mammals of India,' pp. 301–7). Mr. Hodgson describes the Gaur (*Gavæus gaurus* of Jerdan) of the forests below Nepaul as fierce and revengeful.—[H. Y.]

thickness of material being rather less than an inch, for of course they are hollow. The only complete beam I could discover was a hollow girder 15 feet long, nine inches broad, and four inches through, the thickness of bronze being much the same as in the pillars. The panels, of which, by supposing the fragments roughly pieced together, I estimated there are about forty-six, are of the average dimensions of five feet by one foot seven inches. They are about an inch thick, but their frames are thicker, and for some unintelligible reason have slips of iron let into their edges. The panels are very handsomely ornamented with seated Buddhas, flowers, and scrollwork, and with hexagonal arabesques of various modification. The tiles, also of bronze, resemble ordinary Chinese tiles, but are twice as large. Besides these there are several hundreds of iron tiles stacked together. Many supplementary fragments, such as sockets, capitals, corner-pieces, eave-terminals, and decorative adjuncts, were lying about, all far too massive to be carried away down the steep mountain even if the priests would have allowed them to be abstracted.

It is not easy to guess what the size and shape of the building has been, since an unknown number of panels and beams lie hidden under the heap of tiles. The priests told me that externally it had two stories, that the interior was 19 feet 6 inches high, the same in breadth, and 26 feet long. If so it could not have been the shrine built by the Emperor Wan-li, for an imposing bronze tablet,* which, with pedestal and crown-piece, stands 6½ feet high by 32 inches in breadth, records that the dimensions were 25 feet high, 14½ long, and 13½ broad, and that it was erected in 1603.

A few yards from the site of the bronze shrine is a temple crowned by a golden ball—whence the name of Golden Summit. Passing through this on to a small terrace, we found that we were at last standing on the brink of Shê-shên-ngai ("the suicides' cliff"†), perhaps the highest precipice in the world. The edge is guarded by chains and posts, which for further precaution one is not allowed to touch; but as the posts stand out a little over the precipice, one can easily look down without holding by them. The abyss was nearly full of mist, and I could not see more than 400 or 500 feet into it. The face of the rock seemed vertical. When I first caught sight of the mountain from a distance of 50 miles or more, it might have been likened to a crouching lion decapitated by a downright stroke close to the shoulders, the fore feet remaining in position. The down-cleft surface, i. e. the precipice, looked not more than 15° out of the vertical, but the steepest profile was not visible from that point of view. So far as I could estimate, the

* The tablet contains a very long inscription, couched in the highest style of Neo-Buddhist rigmarole, of which I obtained a rubbing.

† The name is so explained popularly, but *shê-shên*—"to cast away the body"—also means to put off the flesh, i.e. to become a monk or nun.

upper two-thirds at least of the mountain are cut sheer down in this manner. My results for the height give 11,100 feet above the sea for the summit, and 1700 feet for the country below; but from a cause which I need not here explain, the measurement is open to a suspicion of error to the amount of about 500 feet in the case of the summit. Even if that allowance be deducted, this tremendous cliff is still a good deal more than a mile high. It is the outpost of the limestone formation, which on this line of latitude extends westward to the T'ung river, where the syenite and granite of the Tibetan plateau first appear.

Naturally enough, it is with some trepidation that pilgrims approach this fearsome brink; but they are drawn to it by the hope of beholding the mysterious apparition known as the "Fo-kuang" or "Glory of Buddha," which floats in mid-air half-way down. So many eye-witnesses had told me of this wonder that I could not doubt; but I gazed long and steadfastly into the gulf without success, and came away disappointed but not incredulous. It was described to me as a circle of brilliant and many-coloured radiance, broken on the outside with quick flashes, and surrounding a central disk as bright as the sun, but more beautiful. Devout Buddhists assert that it is an emanation from the aureole of Buddha, and a visible sign of the holiness of Mount O.

Impossible as it may be deemed, the phenomenon does really exist. I suppose no better evidence could be desired for the attestation of a Buddhist miracle than that of a Baptist missionary, unless, indeed, it be, as in this case, that of *two* Baptist missionaries. Two gentlemen of that persuasion have ascended the mountain since my visit, and have seen the Glory of Buddha several times. They relate that it resembles a golden sun-like disc, enclosed in a ring of prismatic colours, more closely blended than in a rainbow. As far as they could judge by noticing marks on the face of the precipice, the glory seemed to be about 2000 feet below them. It could not be seen from any spot but the edge of the precipice. They were told, as I was, that it sometimes appears by night, and although they did not see it at such an hour, they do not consider the statement incredible.

It may be imagined how the sight of such a portent, strange and perplexing as it would seem in any place, but a thousandfold more astonishing in the depths of this terrible abyss, must impress the fervour of simple and superstitious Buddhists. The spectacle attracts pilgrims from all parts of China and its dependencies. Even Nipalese occasionally journey to the mountain. The Tibetans, lovers of their native snows, prefer the winter for the season of pilgrimage. The only tribes which do not contribute devotees are the Lolos; but although they are not Buddhists, one of them told me that their three deities Lui-wo, A-pu-ko, and Shua-shê-po, dwell on the "Golden Summit."

The missionaries inform me that it was about three o'clock in the afternoon, near the middle of August, when they saw the meteor, and that

it was only visible when the precipice was more or less clothed in mist. It appeared to lie on the surface of the mist, and was always in the direction of a line drawn from the sun through their heads, as is certified by the fact that the shadow of their heads was seen on the meteor. They could get their heads out of the way, so to speak, by stooping down, but are not sure if they could do so by stepping aside. Each spectator, however, could see the shadows of the bystanders as well as his own projected on to the appearance. They did not observe any rays spreading from it. The central disc, they think, is a reflected image of the sun, and the enclosing ring is a rainbow. The ring was in thickness about one-fourth of the diameter of the disc, and distant from it by about the same extent; but the recollection of one informant was that the ring touched the disc, without any intervening space. The shadow of a head, when thrown upon it, covered about one-eighth of the whole diameter of the meteor. The rainbow* ring was not quite complete in its lower part, but they attribute this to the interposition of the edge of the precipice. They see no reason why the appearance should not be visible at night when the moon is brilliant and appositely placed. They profess themselves to have been a good deal surprised, but not startled, by the spectacle. They would consider it remarkable rather than astonishing, and are disposed to call it a very impressive phenomenon.†

### 3. The T'ung River.

Returning to the city of Omi we continued our journey up the Ya valley to Ya-chou, and then followed the high road over the Great Hsiang-ling Pass‡ to Ch'ing-ch'i Hsien, a track which has been frequently

* In a rude chart of the mountain, given to pilgrims, the ring is depicted as broken across on both sides in a line passing horizontally through the centre of the disc.

† This remarkable phenomenon is evidently similar to that of the Giant of the Brocken, regarding which see Sir D. Brewster's 'Natural Magic,' 1833, p. 130. I have described a like phenomenon as witnessed long ago in the Kasia Hills of Eastern Bengal: "Standing on one of the highest points in the station at Cherra, about sunset, I have seen my shadow cast on a distant bank of white fog that filled the valley to the eastward; an appearance resembling that of the celebrated giants of the Hartz and the Stockhorn. The figure was surrounded by a circular iris. The heavy fogs that fill the valley to the east of Cherra render this a common phenomenon at sunset. It has since been pointed out to me that any one may witness this phenomenon on a small scale, in going through the grass at sunrise on a dewy morning. Each will see a faint halo surrounding the shadow of his own head" ('Journ. As. Soc. Bengal,' xiii. pt. ii. p. 616). The last-mentioned form of this phenomenon caused that extraordinary personage Benvenuto Cellini to suppose it was a singular mark of supernatural favour to himself in consequence of certain visions he had had: "Dallora in qua . . . . mi resto un splendore (cosa maravigliosa!) sopra il capo mio . . . . Questo splendore si vede sopra l'ombra mia la mattina . . . . e molto meglio si vede quando l'erbetta ha addosso quella molle rugiada," &c. ('Vita di Benv. Cell.,' Milano, 1806, i. pp. 452–3).—[H. Y.]

‡ Both Abbé Huc and Mr. Cooper have confounded this pass with that of Fei-yueh-ling, two days' journey or so further west on the road to Tibet. Captain Gill has of course properly discriminated them.

described and needs no further notice. I take up the thread of our route at the village of Han-yuan-kai, the furthest place reached in that direction by Mr. Cooper, and called by him Hi-yan-ky. From this point forward my journey is indicated on the chart. The Liu-sha river, rising in the Fei-yueh-ling range not far from the top of the pass, joins near Han-yuan-kai a torrent, generally dry, which runs down from Ch'ing-ch'i, and then continues its course to the T'ung river—here called the Ta-tu—which it enters a little below the large village of Fu-lin. The cultivated part of the narrow valley of the Liu-sha is very fertile, but is liable to be invaded by the sand and shingle of its numerous torrents. The environing mountains rise in places to a height of 7000 or 8000 feet above its floor, and abound in precipices of wild grandeur. A good deal of lead, which includes silver, is mined in the rugged region immediately east of it, and gold is known to occur, but is not allowed to be worked. The valley possesses great local renown for its rice, opium, and silk, the exceptional produce of which is easily accounted for by its low level. West of it there is no such low-lying country until the plains of India are reached. The only practicable road into it from the east is over the Great Hsiang-ling, for the southern track along the T'ung river, which I traversed on a subsequent journey, is always dangerous, and in winter impassable for beasts of burden, on account of the deep crevasses with vertical sides which mountain streams have gouged into the limestone. In consequence of these natural obstacles, and of the occupation of a long strip of intervening country by independent Lolos, the only route by which Chien-ch'ang can be reached from Ssŭ-ch'uan runs through this depression, and for similar reasons the still more important road to Tibet, the only road open since the stoppage of the Koko-nor route, takes the same line. These two highways diverge at Ch'ing-ch'i Hsien, which it is natural to suppose should be a place of exceptionally large trade and population. The contrary is the case. It may be safely asserted that Ch'ing-ch'i is the smallest city in China. The explanation of the paradox is that its site is so closed in by steep mountains that there is no room for cultivation. The villages of Han-yuan-kai, T'ang-chia-pa and Fu-lin have accordingly received the benefit of the Chien-ch'ang carriage, while Fu-chuang (otherwise Fu-hsing-ch'ang) and Ni-t'ou (Captain Gill's I-t'ou) have acquired the monopoly of the road traffic with convoys to and from Tibet.

I reached Fu-lin on the 17th August, after an excursion to a parallel valley. A mile or so further on we came upon the Ta-tu river, at this point 2200 feet above sea-level, running in a very rapid stream, about 180 yards broad. The Liu-sha enters it through a wide shingle flat, not much less than a square mile in extent. The main river sweeps in a grand curve from beneath a line of precipices 3000 feet above its waters, and after clearing the shingle plunges into a narrow gorge and

makes its way eastward, past bluffs which ultimately rise, at Mount Wa, to not much less than the height of the "Suicides' Cliff" of Mount O.

The Ta-tu, or to adopt its more general name, the T'ung, should be regarded as the main upper stream of the Min river, since it brings down a much greater volume of water than either of the two confluents which join it near Chia-ting. At Lu-ting bridge, one of the narrowest points, its breadth is a little under 100 yards, but it is not navigable above Tzŭ-ta-ti; even below that town there are so many rapids and obstructions that the waterway is little used. Between Fu-lin and Sha-p'ing it is only practicable, for the whole distance, for timber-rafts which are floated down to Chia-ting for sale; but the danger of the transit is so imminent that the owners of the timber have to bind themselves to provide the raftsmen with coffins in case of fatal accidents. Below Sha-p'ing there is no difficulty. A wilder or more broken region than that which borders the T'ung can scarcely be conceived; there are few reaches which are not overhung by bare cliffs, often of immense height, and yet every here and there, in nooks between the mountain-spurs, lie small cultivated glens which are models of secluded and tranquil beauty. In such spots opium grows to great excellence; the flowers are mostly red, though the Chinese poppy in other districts is generally white. Nothing relieves the monotony of grey crags so gaily as a field of red and purple poppies. Wan-tung is a favourable instance of such dells; but if the traveller turns his back upon the river anywhere near that point, and ascends the hills on the right bank, an hour's walk will carry him away from cultivation, a day's journey will bring him into the thick of pine-forests, and after clearing these he may climb for another day, or longer, to the summit of mountains 17,000 feet above the sea. The Tibetan road, viâ Ta-chien-lu, crosses this range by a pass which, according to Captain Gill, is 14,500 feet above sea-level.

Supposing an explorer to select Tzŭ-ta-ti as his starting-place, and to turn west, with perhaps a little southing, he may ascend the gorge of Sung-lin torrent and march continually uphill for four days, when he will reach an undulating plateau, the pasture-ground of immense herds of half-domesticated yaks. Not a single tree of any kind grows on that highland; every one of my informants specially averred that when the sun shines there is nowhere to be found a patch of shade from dawn to dusk. Beyond the uplands rises a system of forest-clad hills, among which the best rhubarb in China is gathered, and on the further side of these is a valley with a level bottom and a stream some 60 yards broad, called the Wu-la-ch'i. From the Wu-la-ch'i Mien-ning Hsien can be reached without crossing any high range; it may therefore be suspected that its waters are the head of the An-ning river.*

* Maturer consideration leads me to think that the Wu-la-ch'i is that tributary of the Ya-lung which rises in the Cheh-to Pass.

Perhaps the traveller may prefer to take his outset from T'ien-wan for an exploration of these wild ranges, and to ascend the course of the torrent which flows by that village. The prospect of the track he will have to follow will be likely to dissuade him from the attempt half an hour after starting. A zigzag line of foam roars along a fissure between two rows of precipices which interlock one another. The way through is by clambering from rock to rock in the stream; there is no path; nor is there any means of outflanking the precipices, the summits of the ridge being more like the spikes of a prison-wall than the peaks of a mountain. A Sifan who had made the passage told me that it is only practicable for experienced mountaineers unencumbered with baggage. At the western end of the ravine is a fine valley growing wheat, buckwheat, and potatoes, and containing a lake said to be four miles long by two broad, from which the T'ien-wan torrent issues. The Tzŭ-mei Hills, of which we obtained a distant view, lie west of the lake, and beyond the Tzŭ-mei Hills again is the valley of the Wu-la-ch'i.

Less formidable expeditions may be undertaken from Tzŭ-ta-ti. Mien-ning Hsien is made in four days by ascending the Lao-wa Valley, but a high divide has to be crossed, which is difficult for mules. A much easier route to the same city quits the T'ung and mounts the hill-side about two miles below Tzŭ-ta-ti. That village is the headquarters of a Sifan chief, Wang by name, and by title "Ch'ien-hu," meaning "a Thousand Families." There are other chiefs with the style of "Hundred Families." Such designations do not of course intend any precise enumeration of the aggregate of the families under their jurisdiction, but they are, nevertheless, apt to confuse the uninitiated. When, for instance, one meets an "Eleven Hundred Families," it is natural to conclude that such a dignitary must be of more exalted rank than the chief of a thousand. But the error would be gross, "Eleven Hundred Families" being merely the style borne by the eleventh son of a chief of a hundred families. These terms are probably of Chinese invention, since they are also conferred on Lolo potentates. The well-known name *T'u-ssŭ* means aboriginal district, as well as aboriginal chief, and seems to be a general title, employed when precision is unnecessary. Wang's correct Chinese official title is *Hsüan-fu-ssŭ* (officer for diffusing control) bestowed upon him for distinguished services against the T'ai-pings. I did not make his acquaintance personally, in consequence of a delicate question of etiquette; he was afraid to *kotow* to me, and at the same time feared to refuse the obeisance, being apprehensive, as he privately gave me to understand, that his Chinese superiors would in either case disapprove his conduct. Many messages, however, passed between us. Finding that I spent much time at Tzŭ-ta-ti in sextant observations, he sent to ask if there was any underground gold in his village.

These notes on the Upper T'ung were collected, it should be remarked, during a second journey in the spring of 1878. On returning

from Tzŭ-ta-ti I lost all my funds by a burglary at Na-erh-pa, just outside Wang's jurisdiction. The chief burglar escaped across the T'ung into the wildest part of the Ch'ing-ch'i magistrature, and when the local authorities were induced, after an appeal from me to headquarters, to make an effort for the capture of the culprit, the officers of justice started on his trail with two packs of hounds to pursue him, and a set of iron grapnels to seize him. Hearing of my destitute condition, "Wang of a Thousand" sent me, kindly enough, the sum of 7*s.* 6*d.* and a basket of eggs, with a message explaining that many of the country people are affected with leprosy, and that it is therefore dangerous to eat the eggs which are sold in the markets. The spittle of lepers, it appears, is pecked up from the ground by the poultry, which soon become lepr[illegible]-lay leprous eggs, and so transmit the contagion to the unwitting traveller. Circumstances which I need not recount led me, some days after the receipt of this timely but inadequate present, to make a second visit to Wang's residence, but I found no opportunity of thanking him; he had gone to avenge an outrage which concerned him more nearly than my losses, namely the desecration and plunder of his father's grave. It was the evening of a market day when we returned to Tzŭ-ta-ti, and it is regrettable to relate that most of the Sifan visitors were drunk. But they are, withal, courteous in their cups. The Sung-lin affluent is crossed by a wire suspension bridge, some 120 yards long, an oscillating and vertiginous structure at best, on which it is difficult to pass a drunken man. Several unsteady Sifans, however, made way for me, and one, a good deal more than half seas over, who assured me that "he was drunk again," would not be dissuaded from escorting me across. Near the bridge I gathered a specimen of manners and customs. A young Sifan woman was lying on her stomach in the roadway, a second woman, her sister, sitting on her back and holding her firmly by the pigtail, while a very robust Sifan, her husband, was beating her about the hips with a large chunk of granite. Interference in such family misunderstandings is best made vicariously, so I directed two of my coolies to intervene, which they did with excessive zeal, carrying the husband by storm and knocking him down. I made them help him up, and then sit with him, one on each side, on a low stone wall, holding his sleeves and sitting on his coat so that he could not rise; but while our attention was too exclusively devoted to calming his excitement, his wife rushed forward and tore a strip of skin down his neck with a stroke of her nails. She made no resistance when we drew her back, but ran off and rejoined her sister. As soon as she had left, her husband, to our great astonishment, became perfectly composed and amenable, actually thanking us for our interposition, which he said he fully appreciated, and entered into discursive details respecting the origin of the tiff. He spoke mongrel Chinese, and I could only understand that the party were returning from the trial of a law case, in course of which the wife had

given evidence on the wrong side, and they were now settling the case out of court. The sister, it appeared, was sitting on the wife and holding her tail as a token of condolence with her under punishment, and not as showing any sympathy with the extreme views of the husband. The latter, while insisting that his wife was a bad woman, promised not to beat her any more for present shortcomings, and went off home. I afterwards met the wife and sister, who looked at me seriously and sadly, but without surprise. The oddity of the affair is that both should so calmly have accepted our unwarrantable interference.

One does not see much of the Sifans between Tzŭ-ta-ti and Ta-chien-lu, since the bottom-lands through which the route passes have been rented or bought by Chinese colonists. The immigration is quite recent. I have it on the best authority that the Sifan landlords of Mo-si-mien could not be prevailed upon to allow their Chinese tenants to cultivate rice until 1876. The Mo-si-mien valley, or plateau—either term is applicable—is so singular a formation that a digression thither will be pardoned. I came down upon it from the pass north of Wan-tung, on the summit of which—8000 feet above sea—there is a magnificent fragment of virgin forest, untouched as yet, though closely threatened, by the woodman's axe; not a sombre and cheerless forest of pines, but a growth of many varieties of trees, among the middle branches of which we saw huge globular bunches of parasitic flowers. Descending from this, we struck a milk-white river, which guided us to Mo-si-mien; but instead of lying in the bosom of a glen, as we expected would be the case, the village is perched on the end of a long mound which rises from the floor of a narrow valley between two unfordable torrents. The end of the mound, beneath which the milk-white stream and the two torrents unite, looks like the bows of some immense ship, ready for launching into the foaming waters which wash its forefoot. The deck, so to speak, is level, and the village occupies the forecastle. The sides seem vertical, at any rate from the route by which we approached, but the appearance is illusory, and we easily ascended by a steep zigzag path. Seeing that the valley bore almost in the direction in which Ta-chien-lu should lie, I determined to keep to it, instead of rejoining the T'ung—which is not far distant—and following the main route by Lu-ting Bridge. The mound in question turned out to be more than three miles long, by a quarter of a mile or so in average breadth, and some 250 feet, or more, high; the surface, generally level, but undulating, is sprinkled with a good many loose rocks of large size—I noticed some of more than 2000 cubic feet—but the mass of it is earth, to all appearance, and I could not discover any rock *in situ*. The two currents run parallel to one another, as will be seen from the chart, on which, for the sake of clearness, it has been necessary to separate them more widely than the truth.

Near the hamlet of Lama-ssŭ, this curious ridge gradually effaces itself to the level of the valley. Its proportions are so great that it did not occur to me, while marching along it, to reflect upon its origin; nor did I know, at the time, that we were beginning the ascent of a range covered with perpetual snow. But after entering the pine forests which begin a little above the hamlet of P'u-tzŭ, it struck me that we had been travelling along the central *moraine* of an extinct glacier; a reference to the chart will show that the tail of the mound springs from a mountain spur between two valleys in precisely the manner which such a formation requires. The lateral moraines would have formed the further banks of the existing torrents; but under the circumstances I did not happen to look for them, and in any case they would have been undistinguishable from the hillsides, covered as these are with long grasses. Moreover, when the enormous glacier finally melted away, the side moraines, previously propped up by the ice, would have slid down into the beds of the present torrents, in which there are enough rocks, indeed, to satisfy the most exacting demands on that head. The central moraine, on the other hand, would merely have subsided without losing much of its mass.

Whatever may have been the origin of the mound, it is well worth the attention of future explorers. The place is not more than a day's journey from the point where the Hua-lin-p'ing road strikes the T'ung, and the traveller who is on his way to Ta-chien-lu may very conveniently send his baggage on by the main road, while himself diverging into this bypath with sufficient necessaries for three days, and so gaining Ta-chien-lu over the *col* of Ya-chia-kang. He will thus reach the town almost as soon as his baggage, and in the pine forest and snowy pass will obtain a foretaste of Tibet.

Not to prolong this digression unduly, I will merely add that we walked for two days up the easiest gradient in the world through dense pines, from the branches of which hung, almost like veils, long streamers of a kind of moss locally called Mu-lu-ssŭ—probably the "fairies' scarf" mentioned by Mr. Cooper—imparting a blue-green tinge to every vista which the never-failing fog would allow us to perceive. A scarlet lichen clothed in many places the rocks which strew the watercourses. At 11,000 feet the pines fade away, but the rhododendrons are so thick that it is not easy to stray from the path. Near this point a kind of francolin walk across the track with the deliberateness of poultry. We attempted in vain to put them up, although we could openly approach them to within six or seven yards; indeed, we went to the length of trying to catch a specimen, with the purpose of throwing him up in the air to see if he could fly. The rhododendrons were too close, and the birds far too clever, to allow of a capture, but I shot a brace with a revolver, by way of giving them law, which is a sufficient proof of their tameness. The highest hostel, a miserable cabin, where firewood is not

to be obtained, since the spot is well out of tree-limit, lies at 11,700 feet above sea. Beyond this the path becomes steep, vegetation disappears, with the exception of a few sticks which look like abortive rhododendrons, and we soon reach the *col* of Ya-chia, 13,000 feet above sea and 4600 feet above Ta-chien-lu. Although there are higher passes in the same range—the Cheh-to of Captain Gill, written Jeddo by Mr. Cooper, is 1500 feet higher—Ya-chia-kang enjoys a pre-eminent reputation for its violent and asphyxiating winds, and is said to be the only pass in the neighbourhood which "stops people's breath" (*hang jên*). The passage is much dreaded in windy weather on this account; but although it was nearly calm when we crossed, we were nevertheless affected in various ways by the rarefaction. One of the porters began to gasp and grow black in the face, but a short rest brought him round. A more curious adventure befell a Sifan who was acting as my henchman, and was burdened with nothing but an overcoat. Happening to require the garment, and turning round to take it from him, I saw him standing motionless in the snow 200 feet behind. As he would not stir when called, I went back to see what had happened to him, and found him fast asleep, all standing. On being waked he complained of nothing but a sensation of drowsiness, which he soon shook off. My own experience was a pleasant one; a headache, which had come on at about 11,000 feet, disappeared completely as the top was neared, but returned during the descent. We saw almost nothing from the summit; the usual mist enveloped us, but a narrow break, opening through it like a tunnel, showed us for a few moments in the south-west a high, jagged peak of the purest and brightest silver, overtopped by the moon, and backed by a patch of pure sky. Framed in very narrow compass by the rim of white fog, the picture was most magical and unearthly; even the stolid Chinese waxed rhapsodical, and cried, "Silver, silver!" but as they think of nothing but silver all their lives, their enthusiasm may have been gross and worldly.

The snow clears off the *col* in May, but as we went down the mountain, which is seamed by the most savage torrent gorges, we left the fog behind, and could see that we had passed between peaks and crags of great elevation. The snow never melts from these, and their height may therefore be assumed to be more than 17,000 feet. North of us, on the other side of Ta-chien-lu, stretched a wide expanse of snowfields and ridges, probably of still greater height. In a few hours we struck the high road to Tibet, at the foot of the Cheh-to Pass, after strolling along a treeless pasture where a herd of yaks, the property of the king of Djia-la, were grazing, and soon trudged into Ta-chien-lu, a small town lying at the western end of a very narrow valley, so narrow, indeed, that for miles together it has no floor but the path and the torrent, which, after 15 miles of cataracts, plunges into the T'ung at Wa-ssŭ-kou; a mere gorge, in short, between two snowy spurs of the range over which

the Cheh-to road passes. One of these spurs is that which we have just crossed, and the other is the region of sierras and snowfields which we saw from Ya-chia-kang.—But Captain Gill will not thank me if I encroach further upon his ground.

That stretch of the T'ung which runs from Wa-ssŭ-kou to Tzŭ-ta-ti has the best claim to be considered the boundary between China and Tibet. In an administrative sense there is no doubt on the subject, since the Ch'ing-ch'i magistrature extends to the left bank, while the right bank is the territory of indigenous chiefs—T'u-ssŭ. Geologically, the same demarcation obtains; the river runs along the line where limestone gives way to granite. The first intimation of the change appears near Tsai-yan-ch'i, on the left bank, where the rock is syenitic porphyry; but a mile or two west of this is a gap of limestone, in which coal is mined, and a little further west, opposite Na-erh-pa, a bluff of pumice abuts on the river. We were told that if the hillside above the spur of pumice be ascended, a hollow full of water will be met with, on the brink of which tradition warns the wayfarer not to talk aloud nor to linger, but to pass on. Such legends often attach to volcanic chasms or craters. What may be the nature of the rock west of this point at the great bend of the T'ung, and on its left bank, I had no opportunity of examining; but from the shape of the hills, and other intimations, it may be judged to be the same as on the opposite bank a short distance above Lao-wa-hsüan, viz. syenite of a fairly close grain. It is by this promontory of syenite, a toe of the Himalayan plateau, if the expression may pass, that the river, or rather the fissure in which it flows, has been abruptly turned athwart into an eastern course. Near Tzŭ-ta-ti limestone reappears, but about Hei-lao-wa comes granite, with a pronounced tendency to disintegration.

Gold is washed above Lu-ting Bridge, in the manner described by Captain Blakiston on the Upper Yangtzŭ. It is also found in nuggets, occasionally of large size, in the border country. At the turn where the highway to Ta-chien-lu leaves the T'ung (i. e. at Wa-ssŭ-kou), gold-borings driven into the rock may be seen on the further bank. I could not approach the place; but the gold was offered me for sale in the shape of pills of clay, full of minute scales of the precious metal. Quite lately, gold has been discovered close to Ta-chien-lu, and the rush of diggers has caused a good deal of embarrassment to the authorities.

Sulphur is procured in saleable quantities from the mountains round Ta-chien-lu; the inhabitants of the ravines may often be seen engaged in the manufacture of matches of the Guy Fawkes pattern, which they split from a pine-plank with a spokeshave, and tip with sulphur. During my penniless residence at Na-erh-pa, I generally used these sulphur chips to procure a flame.

North of Wa-ssŭ-kou the T'ung is called Chin-ch'uan (" gold stream "), a term which is also applied to the district which it drains, governed by

local chiefs, and divided into Greater and Lesser Chin-ch'uan. Nothing whatever is known of it to Europeans, including myself, except that the country was conquered by the generals of Kien-lung, in 1775, after a most determined and heroic resistance on the part of the natives. The story will be found in De Mailla's History, where the people are very misleadingly called "Miao-tzŭ"; there is no doubt that they are a branch of the Sifan, again a misleading term, which I shall be obliged to employ, but which means neither more nor less than what we understand by "Tibetans," though of course there are many tribal subdivisions. I will recur further on to the ethnological question.

However romantic and charming to the traveller's view may be the situation of the villages in this wild region, the inhabitants are exposed to calamities by flood and fire which must render a prolonged residence undesirable. We assisted at a conflagration which nearly demolished Na-erh-pa, and passed many a hamlet which had only lately risen from its ashes. The dwellings are all built of wood, and are situated on the border of torrents, often in very hazardous positions. The Liu-sha-ho ("sand-shifting river") is notorious for its excesses; on a second journey to Fu-lin I crossed a bed of shingle where, a year before, I had passed through teeming rice-fields. The most memorable accident by flood occurred in 1786, when a cliff fell into the T'ung somewhere near Wan-tung, and completely dammed the stream. Warning being duly sent through all the lower country by the local officials, the natives of the gorges, well able to appreciate the danger, took to the hillsides; but the people of Chia-ting Fu, trusting in the breadth of their plain, over which they imagined the water would harmlessly diffuse itself, disregarded the notice, and the cry, "Shui lai-la" ("the water is coming") even obtained great vogue as a street joke. It was holiday in Chia-ting some days after the receipt of the notice, and the light-hearted crowds which gather on such occasions were chiefly attracted by a theatrical representation on the flat by the water-side. One of the actors suddenly stopped in the middle of his *rôle*, and gazing up the river, screamed out the now familiar by-word, "Shui lai-la!" This repetition of the stock jest, with well-simulated terror, as it seemed to the merry-makers, drew shouts of laughter; but the echoes of the laugh were drowned in the roar of a deluge. I was told how the gleeful faces turned to horror as the flood swept on like a moving wall, and overwhelmed 12,000 souls.

There can be no doubt of the main truth of the story, though the number of victims must be greatly exaggerated. 12,000 souls would represent little less than half the population of Chia-ting. The people of the country are fond of relating the story of the theatre, as they well may be; for among records of disaster it would be difficult to find a more dramatic catastrophe.

Leaving Fu-lin, we crossed the famous ferry from which the T'ung takes its local name of Ta-tu ("great ferry") on August 18th. A detour

of some distance has to be made into the eastern gorge to avoid a series of rapids. When the ferry-boat came alongside the usual crowd of passengers tumbled in, all attempting to sit on the same side; and even our pet monkeys, which I found very useful in diverting native attention from my own vagaries, showed signs of not unreasonable alarm. When we stepped ashore, we were in the nondescript region of Chien-ch'ang.

In Ta-shu-p'u, a fortified village a mile or so south of the ferry, we were eye-witnesses of the devastation which a swollen brook may cause. A fortnight before our arrival a fall of hail was succeeded by a violent storm of rain and lightning, and, soon after, a great rush of water from the plateau on the east suddenly issued from a previously dry gully and entered the bed of an insignificant rivulet which runs from the south towards the little town. The fierce flood, urging along masses of rock, utterly destroyed the suburb, burst in the iron-plated town-gate, which had been vainly closed in its way, and drowned or crushed some 200 people who were attending the market. So much is what we were told. What we saw was the battered gate lying inside the wall; a limestone boulder of about 20 cubic feet obstructing the archway where the gate ought to have been; and, outside, a double heap of débris, 120 yards long, representing the houses of the suburb. The street-way of the suburb was all furrowed and disjointed, as if it had been scratched by an immense harrow. Repairs had hardly been begun; but a little further on a fine dyke of cemented blocks was in course of construction, the massive nature of which—it is to be 10 feet thick by 12 feet high—inspires great respect for the gutter which requires such a kerb-stone.

But Ta-shu-p'u can afford to regard with placidity the sudden death of a few hundred market-people, after the scene of slaughter it witnessed fourteen years previously. At the risk of overcrowding these pages with tales of calamity and massacre, I am bound to recite the story—rather, the history—of a crowning mercy which cannot fail to interest those who sympathised with, or who opposed, the rebellion of the Taipings. What became of Shih Ta-k'ai, the assistant king? is a question which foreigners have often asked. I found a reply on the banks of the T'ung. The following account, taken from official sources hitherto unexplored, gains additional importance from its geographical allusions. Most of the localities mentioned occur in my chart; the remainder are indicated in notes.

"In January 1863, after having been routed in a series of engagements on the Hêng river (the stream which enters the Yangtzŭ on its right bank between Sui-fu (Sü-chow) and P'ing-shan, Shih Ta-k'ai, the most ferocious and crafty of the rebel kings, formed his troops into three divisions, one of which he sent from Fu-kuan-ts'un into the province of Kuei-chou. (With this division we are not further concerned.) His lieutenant, Lai Yŭ-hsin, was despatched into Chien-ch'ang with the second division, Shih Ta-k'ai himself intending to follow with the main

body. Lai's corps of 30,000 or 40,000 men accordingly marched to Hui-li-chou (by what route does not appear), and thence to Tê-ch'ang, where a great many recruits were gained among the opium traders and disorderly characters of the neighbourhood. They reached Ning-yuan Fu on the 16th of March, but were defeated next day, with a loss of 2000, by an Imperialist force; still pressing on, they made an unsuccessful assault upon Mien-shan on the 21st, and were again worsted at Yueh-hsi T'ing, losing their leader, Lai Yü-hsin, who was killed by a Lolo with a stone. Hurrying forward in great disorder, they crossed the T'ung on the 26th, and continued onwards by Ching-ch'i Hsien and Jung-ching Hsien into the T'ien-ch'üan country, through which they passed into Northern Ssŭ-ch'uan." (There they seem to have dispersed, whether of their own intent, or in consequence of repeated attacks, is not clear; but it is fairly certain that a large proportion made off into Shensi and Kansu.)

Shih Ta-k'ai, "careless of distance or danger, and always on the watch for an opening," had sent forward this division to divert attention from his own movements, expecting, it was presumed, that the Imperialist forces would follow in hot pursuit, without looking to their rear or concerning themselves with the possible advance of a second rebel corps. The Governor-General Lo Ping-chang, however, foresaw the design, and made dispositions to frustrate it. In his Memorial on the subject he remarks that "the importance of occupying all the approaches from Chien-ch'ang became evident. The T'ung river, the natural protection of the south-western frontier, rising in the country of the Tien-ch'üan tribes, runs through the Yü-t'ung region, past the Wa-ssŭ Ravine and Lu-ting Bridge, into the Lêng-pien * and Shên-pien districts, traverses the magistrature of Ching-ch'i, and then enters the Lolo territory. We had therefore to guard the line from An-ch'ing-pa † to Wan-kung, a length of more than 200 *li*, including thirteen ferries, exposed to an advance both by the Yueh-hsi road and the track viâ Mien-ning Hsien. And besides this, it was indispensable to hold the line from Lu-ting Bridge to Wan-tung, since there are many places at which the rebels might have crossed the T'ung, supposing them to have previously passed the Sung-lin affluent; a wide flanking movement in that direction would have enabled them to gain the T'ien-ch'üan country.

"A detachment was accordingly sent, under T'ang Yu-kêng, to act between An-ch'ing-pa and Wan-kung; and Wang, chief of a thousand families in the Sung-lin district, was directed to keep the Sung-lin

* *Lêng-pien* and *Shên-pien* are Tu-ssŭ districts respectively north and south of Hua-lin-p'ing. Shên-pien contains very few aborigines. Yü-t'ung is a tribe of the T'ung valley, a little above Wa-ssŭ-kou.

† An-ch'ing-pa is a fertile plateau and village on the left bank of the T'ung, opposite Tzŭ-ta-ti, two or three miles inland. Wan-kung is an insignificant hamlet a few miles east of the ferry below Fu-lin.

affluent with his aboriginal forces, with a view to prevent a turning movement upon Lu-ting Bridge and Hua-lin-p'ing. Another detachment was stationed in reserve between Hua-lin-p'ing and Wa-ssŭ Ravine; and, lastly, a corps was posted at Mo-si-mien to stop any advance upon Ta-chien-lu.

"Lai's band had by this time escaped into Shensi. After measures had been taken to cut off their return, the Lolo chief Ling was directed to occupy the Yueh-hsi passes, so as to prevent Shih Ta-k'ai from entering the Lolo territory. Presents were at the same time distributed among Ling's Lolos and the aboriginal troops of 'Thousand Family' Wang to encourage and stimulate their zeal.

"T'ang Yu-kêng's force reached the T'ung on the 12th of May, Shih Ta-k'ai having in the meanwhile crossed the Upper Yangtzŭ at Mi-liang-pa, entered Chien-ch'ang, found the Yueh-hsi main road blocked, took the alternative route by Mien-ning Hsien, and so descended, on the 15th, with 30,000 or 40,000 men upon the village of Tzŭ-ta-ti, in the district governed by Thousand Family Wang, at the confluence of the Sung-lin with the T'ung. During the night both streams rose several yards in consequence of heavy rain, rendering the passage dangerous, and the rebels began to construct rafts. They made a reconnaissance of the crossing on the 17th, and on the 21st sent down a party 4000 or 5000 strong, carrying 'several tens' of boats and bamboo rafts, upon each of which 'several tens' of the most desperate embarked as a forlorn hope, covered by shields, and advanced to force the crossing. The whole army came out of their huts to support them from the bank and cheered them on with howls which echoed down the gorges like peals of thunder. Our men, however, stood fast, and when the enemy had reached mid-channel opened a steady fire, which killed several chiefs in red uniform and exploded a powder magazine on one of the rafts, hurling the rebels pell-mell into the water. A few rafts which had been carried away by the current were followed up from the bank and sunk, and not a soul of the attacking party escaped alive.

"Nevertheless, during the following night the rebels again reconnoitred the crossing, and appear to have satisfied themselves that it could not be carried. Thenceforward they confined their efforts to the passage of the Sung-lin affluent, with the object of gaining Lu-ting Bridge, and invading the T'ien-ch'üan region, but they were repulsed time after time by Thousand Family Wang, and lost several thousand men in the attempt.

"On May the 24th, Ling, coming up with his Lolos from Yueh-hsi, fell upon the rear of the rebels near Hsin-ch'ang, and after repeated attacks captured their camp on Saddle Hill * on the night of the 29th. From that moment the rebel case became hopeless. After a futile

* Saddle Hill (Ma-ngan-shan) is an eminence on the right bank of the T'ung, a short distance below Tzŭ-ta-ti. The village of Hsin-ch'ang lies on its western slope.

attempt to gain over the native chiefs Wang and Ling, Shih Ta-k'ai, furious at finding himself involved in a situation from which escape was impossible, slaughtered 200 local guides as a sacrifice to his banners, and on the night of the 3rd of June attempted to force the passage of the main river and of the affluent simultaneously. Both assaults were again repulsed. After killing and eating their horses, the rebels, now reduced to the last extremity of famine, were allaying their hunger by chewing the leaves of trees; nevertheless, on the 9th of June they made another general attack upon the crossings, but all their rafts were either sunk or carried away down the swift current.

"The end had come. 'Thousand Family' Wang, reinforced by the Mo-si-mien detachment, passed the Sung-lin on the 11th of June, and assaulted the rebel quarters at Tzŭ-ta-ti. At the same time the Lolo auxiliaries, coming down from Saddle Hill, advanced upon the rear of the position, which was thus completely enveloped. Thousands of the insurgents were killed in the actual attack; but all the approaches to the place being commanded by precipices and confined by defiles, the fugitives became huddled together in a dense mass, upon which the regulars kept up a storm of musketry and artillery, while the Lolos occupying the heights cast down rocks and trunks of trees, which crushed them or swept them into the river. More than 10,000 corpses floated away down the T'ung.

"Shih Ta-k'ai, with 7000 or 8000 followers, escaped to Lao-wa-hsüan, where he was closely beset by the Lolos. Five of his wives and concubines, with two children, joined hands and threw themselves into the river, and many of his officers followed their example. As it was indispensable to capture him alive, a flag was set up at Hsi-ma-ku* displaying the words 'Surrender, and save your lives,' and on the 13th he came into the camp, leading his child, four years of age, by the hand, and gave himself up with all his chiefs and followers. Some 4000 persons who had been forcibly compelled to join him were liberated, but the remaining 2000, all inveterate and determined rebels, were taken to Ta-shu-p'u, where, on the 18th of June, Government troops having been sent across the river for the purpose, a signal was given with rocket and they were surrounded and despatched. Shih Ta-k'ai and three others were conveyed to Ch'êng-tu on the 25th, and put to death by the slicing process; the child was reserved until the age prescribed by regulation for the treatment of such cases."

The above is a condensed extract from an official report contained in the Memoirs of Lo Ping-chang, Governor-General of Ssŭ-ch'uan. The main facts are unquestionably authentic, but the story is of course written from the Imperial point of view, which regards all opponents as bandits and miscreants, who can hardly hope to escape condign

* Hsi-ma-ku lies on the Lao-wa river, some seven miles south of Lao-wa-hsüan.

vengeance. It is therefore vain to expect from it any trustworthy indication of the plan of campaign which guided Shih Ta-k'ai in making these extraordinary detours, or any faithful account of the causes which brought about so complete a disaster; but from inquiry along his line of route, I am satisfied that the explanation is not far to seek. The cause of his action was his inability to cross the Yangtzŭ at or near Sui-fu. The neighbourhood of the Hêng river is a barren region of rocks and ravines, which his large force must very soon have "eaten up"; leaving out of the question the Imperialist statement, which does not deserve much credit, of his defeat in that district, it is evident that his supplies must soon have failed, and that he could not have long maintained his position. Under such circumstances a sudden march upon Ch'êng-tu by Hui-li-chou and Chien-ch'ang offered several advantages. It would at the outset have the appearance of an acceptance of defeat and of a retreat into Yunnan, thus putting the Imperialists off their guard; it would be a march through an undefended district; and by the sudden return up the Chien-ch'ang Valley Ya-chou would be surprised, and the approaches to the capital of the province, and its fertile plain, carried without much difficulty. The superfluous and less efficient part of the rebel forces was therefore sent on an expedition into Kuei-chou, and with the view of drawing off the Imperial troops Lai's command was ordered to advance through Chien-ch'ang.

Curiously enough it was the very inactivity and unreadiness of the Provincial Government which defeated these promising tactics. Lai's division, so far from drawing off Imperialist attention, took the Governor-General by surprise, and passed through almost without molestation; so unimpeded indeed was their march, that I heard of cases where the main body turned back deliberately to avenge insignificant attacks upon stragglers in their rear. Not until Lai had entered Chien-ch'ang did the Governor-General surmise that his capital was exposed to be taken in reverse by such a movement. The dispositions described in his Memorial were in reality made to stop Lai's passage, but came all too late for that purpose, though in the nick of time to prevent Shih Ta-k'ai's advance, which was quite unexpected. It was then only necessary to close the pass—about two yards wide—which leads from Lu-ku to Yueh-hsi, thus forcing Shih Ta-k'ai's army to ascend the main valley, at that point alluringly broad and easy, to Mien-ning Hsien, and so to become gradually involved in the inextricable gorges which border the T'ung. If the river could be held, the rebel force must then inevitably perish from mere starvation.

Only a personal knowledge of the country and of the tribes which inhabit it could have enabled the rebel chief to foresee these dangers. He was utterly ignorant of such details. He probably expected that the Lolos and Sifans would join him or remain neutral, or—as is more likely—with the usual conceit of the Chinese, who esteem themselves

the only fighting people in the world, made little account of their opposition. But it is certain that all the credit of his crushing defeat and surrender is due to these hill tribes, who fought purely for their own hand, and with their exact knowledge of the local defiles and approaches easily cut off the rebel supplies, and then made short work of the blockaded starvelings. In the Governor-General's Memorial cannon, musketry, and rockets play a conspicuous part, but from all I could learn from the natives the battles were mostly conducted with such primeval artillery as bows and arrows, stones, rocks, and tree-trunks.

### 4. The Chien-ch'ang Valley.

Chien-ch'ang, otherwise the Prefecture of Ning-yuan, is perhaps the least known part of the Eighteen Provinces. Two or three sentences in the book of Ser Marco, to the effect that after crossing high mountains, he reached a fertile country containing many towns and villages and inhabited by a very immoral population, constitute to this day the only description we possess of *Cain-du*, as he calls the district. The fact of its being unexplored is sufficient, without the other inducements held out by the generally sedate Venetian, to make it "a very pleasant country for young fellows to go to."

Our first plunge into the unknown did not, however, greatly prepossess us with its attractions. We ascended a narrow glen between treeless hills sparsely grown with maize to a pass about 2000 feet above the T'ung, then dropped 1000 feet to the bed of a torrent which disappears through a wild gorge to the west, and ascended again to the village of P'ing-i-p'u, bordered by a few rice-fields. Although the vale seems very unproductive, the water-mills for grinding corn are numerous enough to reassure one with respect to the food supply; no doubt a certain cultivation of the ravines on both sides of the route brings a reinforcement of grist. The mill-wheel lies horizontally; and the water, admitted by a side-adit, strikes the spokes, which are planks offering their faces to the current, and so drives a mill-stone having the same axis as the wheel.*

The latter part of the day's route is rendered dangerous by falling rocks. Many loosened masses lie on the hillsides ready to shoot suddenly down on the hollow way from slight disturbing cause. Near the village we passed the corpse of an unlucky pony which had been battered to death in this manner, and were told that four mules, valued at 70 dollars apiece, had lately been crushed near the same spot. After Ta-wan is passed the precipices close in upon the stream leaving barely sufficient space for a narrow path which works along under a wall of rock. The more dangerous bluffs line the further brink of the torrent;

* This is the mill-wheel employed in the Himalaya, in Norway (I believe), and in Sicily; probably in other parts of the world. In the Himalaya it is called *grât*, a word surely identical with *grit* and *groat* in spite of Grimm's law!—[H. Y.]

where a glance into its bed is possible through the border of ferns and wild flowers one sees that it is crowded with blocks whose fresh angularity shows that they have toppled from the heights. In some places such stony cascades have cleared the stream and shot across upon the pathway. Here and there the bluffs under which the way winds not only overlean but even hang down pendulous masses, not of honest limestone, but of a very coarse conglomerate of that rock with pebbles and earth full of spreading roots. The wayfarer has twice or three times to stoop his head under such clusters, and although there is no danger at all he draws a freer breath after passing.

The precipices are not high; the highest is perhaps 200 feet. But the inaccessible hill-tops above recede very slightly, and rise to not less than a thousand feet above the stream. That they are inaccessible may be concluded from their being covered with forest growth; no Chinese woodman ever spares a tree which he can approach within reach of axe or fire. Shên-kou (deep gully), as the ravine is called, leads immediately on to the little plateau of P'ing-pa, and through the village of the same name, a straggling collection of wooden huts the inhabitants of which were spending the afternoon somewhere else, possibly at work in the fields. Very little of the upland is tilled; the chief products are barley, maize, buckwheat, and two kinds of tobacco, the *lan hua* and the *ch'erh*. The latter has a shorter and rounder leaf than ordinary tobacco, and affords a much more powerful narcotic. It is said to grow best at high elevations. The few people we met were dressed in woollen cloth of two kinds; one a coarse Tibetan frieze, and the other a close but rather hard fabric woven by the Lolos. Crossing the plateau between low hills denuded of timber, although through the gaps we could see clumps of trees, the groves in which the Lolos burn their dead, we ascended very slightly to a "divide" 7800 feet above sea, at which point we entered upon that part of the road which is considered to be most endangered by Lolo incursions. And in fact a few miles further on we reached a station occupied by a small garrison of Chinese and subject Lolos who keep constant watch against the marauding mountaineers. Spears and firelocks hang ready to hand under the eaves of the pine-built cabins all along the little street; vigilant communication is maintained with the sentinels on the hill-crests, and several of the garrison carried the match for their firelocks coiled in readiness round their wrists. We had met no Lolos before this. The few representatives of that persistent nationality which we here saw, though acknowledging allegiance to the Chinese, and speaking Chinese fluently, retained their native costume in its integrity, and evidently admitted no inferiority to their Chinese comrades in arms.

The post commands a grand prospect of a wide open valley, the trough of an affluent of the T'ung, the only view of Lolo-land anywhere obtainable down the whole length of Chien-ch'ang. The valley runs

approximately from south-west to north-east. Its southern boundary is a long level ridge extending as far as the sight can trace, its crest and upper slopes covered with forest, and its spurs cultivated. It rises in all probability to 11,000 feet and may be surmised to be the western incline of the snowy central ranges of Lolodom, heights of which we afterwards gained a perspective from the further bank of the Upper Yangtzŭ.

We dropped down a boulder-strewn path in half an hour to Hai-t'ang, otherwise Ning-yueh, a small frontier town confided to the charge of a major, whose action is unhampered by the presence of any civil authority. Seven hundred soldiers, under his command, are distributed among various posts in the neighbourhood and receive 3200 cash—say 11*s.* a month per man. The town and all the hamlets many miles beyond are simply garrison stations containing inns for traders and traffic. We did not pass, during the day's march to this place, a single package of merchandise, but were told that in this part of the route goods are detained until a company assembles of sufficient strength to protect itself from Lolo attacks.

The situation of Hai-t'ang is likened to the bottom of a bowl, the rim of which is surrounded by Lolos. A deep gully, however, leads directly down into the valley above mentioned. About six miles from Hai-t'ang, passage is said to be barred by a river which no Chinaman is suffered to pass unless he has found a Lolo to go bail for his good conduct. The Lolos themselves swim or wade across, according to the season, and with the aid of a rope climb a bluff which forms the further bank. Inquiry at many places on the border invariably elicited the assurance that Chinese traders that enter the country under bail are safe from molestation, and make good profits. In matters of trade the Lolos are simple and conscientious, but at the same time they will not calmly endure sharp dealing, still less evident trickery or bad faith.

We climbed out of "the bowl" on to a down, two miles or less in breadth, bordered by low hills on which a few patches of forest survive. The land is very scantily cultivated; the sparse hamlets are all fortified and there are no detached farm-houses; the inhabitants are almost without exception soldier-colonists. Travelling along the level uplands we frequently met well-clothed soldiers in uniform, armed with firelocks, spear, or bow with thick sheaf of arrows, and sometimes carrying all these muniments. They told me that they lived easily, tilling as much land as they pleased at a nominal rent. The extent of waste ground which might be grown with maize, buckwheat, and potatoes, is certainly surprising to one who has but lately quitted the crowded furrows of Ssŭ-ch'uan.

While we were at breakfast several border Lolos gathered round and I had a good opportunity of considering them. They are a far taller race than the Chinese; taller probably than any European people. During the journey we must have met many hundreds of them, but we

never saw one who could be called, even from an English standard, short or undersized. They are almost without exception remarkably straight-built, with slim, but muscular limbs; many of them are robust, but anything approaching the pork-fed obesity of an affluent sedentary Chinaman seems unknown. Their chests are deep, as becomes mountaineers; the speed and endurance with which they scale their native mountains is a prodigy and a proverb for the Chinese. Their handsome oval faces, of a reddish brown among those most exposed to the weather, are furnished with large level eyes. Prominent but not exaggerated cheekbones, an arched but rather broad nose, an ordinary mouth somewhat thin lipped, and a pointed and characteristic chin from which the beard has been plucked. The same process has denuded the upper lip, which is of good proportion. Their teeth are remarkably white and regular, a preservation for which they account by asserting that they never eat roast meat, but always boil their food. Perhaps the most marked character of their faces is a curious tendency to wrinkles, especially on the forehead, which is low, but broad and upright. The lowness of the features may be merely an illusive appearance, since it is overshadowed by a peculiar style of hairdressing. With very rare exceptions the male Lolo, rich or poor, free or subject, may be instantly known by his *horn*.* All his hair is gathered into a knot over his forehead and there twisted up in a cotton cloth so as to resemble the horn of a unicorn. The horn with its wrapper is sometimes a good nine inches long.† They consider this *coiffure* sacred, so at least I was told, and even those who wear a short pigtail for convenience in entering Chinese territory still conserve the indigenous horn, concealed for the occasion under the folds of the Ssŭ-ch'uan turban.

I heard however of a subject tribe near Lui-po T'ing which has abandoned the horn, as a concession to Chinese prejudices, but without adopting the pigtail; but since the retention of hair on the front of the head would still be regarded as a horn, while if it were allowed to grow on the back it would be construed into a pigtail, they have hit upon the radical expedient of shaving their heads altogether.

The principal clothing of a Lolo is his mantle, a capacious sleeveless garment of grey or black felt gathered round his neck by a string, and reaching nearly to his heels. In the case of the better classes the mantle is of fine felt—in great request among the Chinese—and has a fringe of cotton-web round its lower border. For journeys on horseback they have a similar cloak differing only in being slit half-way up the back; a wide lappet covering the opening lies easily along the loins and croup of the horse. The colour of the felt is originally grey, but becomes brown-black or black, in process of time. It is said that the

* See also Biddulph's 'Tribes of the Hindoo Koosh,' p. 129.—[W. G.]

† See these horns on figures from a Chinese drawing in Marco Polo, Book ii. ch. lviii.—[H. Y.]

insects which haunt humanity never infest these gabardines. The Lolo generally gathers this garment closely round his shoulders and crosses his arms inside. His legs, clothed in trowsers of Chinese cotton, are swathed in felt bandages bound on with strings, and he has not yet been super-civilised into the use of foot-gear. In summer a cotton cloak is often substituted for the felt mantle. The hat, serving equally for an umbrella, is woven of bamboo, in a low conical shape, and is covered with felt. Crouching in his felt mantle under this roof of felt the hardy Lolo is impervious to wind or rain.

Of their women I have unhappily seen few but the younger folk; joyous, timid, natural, open-aired, neatly dressed, barefooted, honest girls, devoid of all the prurient mock-modesty of the club-footed Chinese women; damsels with whom one would like to be on brotherly terms. Several of them, natives of the vicinity of Yueh-hsi, came to peep at me in the verandah of the inn, their arms twined round one another's necks, tall graceful creatures with faces much whiter than their brothers'. They did not understand Chinese, and scampered away when I made bold to address them. But a sturdy Lolo lord of creation, six feet two high—whose goodwill I had engaged by simple words—went out and fetched two armfuls of them—about half-a-dozen. It would have been unkind to presume upon this rather constrained introduction, especially as they were too timid to speak, so I dismissed the fair audience with all decorous expedition. Their hair was twined into two tails and wound round their heads; they wore jackets, and flounced and pleated petticoats, covered with an apron and reaching to the ground.

In disagreeable contrast to these petticoated Oreads an old Chinese scribe sat near my breakfast-table writing letters to the deceased relatives of the Chinese garrison, enclosing paper, stamped in imitation of money, to defray current expenses in the other world. When duly sealed and addressed, these "dead letters" are burnt, and the Post Office order is supposed to have reached its destination. Even the murdered female babies are furnished with funds by this process. Well-to-do people forward, by the same method, servants, horses, and even concubines of paper and stick; and if the deceased has been an opium-smoker, an imitation opium-pipe, with all the apparatus complete, is transmitted to him. The Chinese imagine this odd custom to be Buddhist; but it is more probably a survival of funeral sacrifice. It at once recalls a practice which Herodotus attributes to the Scythians who, "when their king dies, bury with him one of his concubines, his baker, his cook, his groom, his secretary, his horses, and the choicest of his effects." The Chinese have found it more expeditious and economical to burn all such personal property in effigy.

In the afternoon we descended a series of half-cultivated valleys to the camp of Liao-i-p'u, accompanied by an escort of some twenty

privates relieved every two miles by a fresh squad. The guardians of these lone uplands are very different from the ragged rascals who are supposed to guarantee the peace of Eastern China. They are well and even luxuriously clothed in shirt, uniform jacket, blue knickerbockers, fifteen folds—I have often counted them—of cotton leggings, and the true classic sandal, neatly shaped to the sole and bound round the ankle with coloured strings. A broad flapping straw hat covers their cleanly plaited hair. Their weapons, strange to say, are mostly bright, but this is perhaps attributable to the dryness of the climate rather than to soldierly cleanliness. A sergeant armed with a broadsword led the van, and the rear was brought up by a mounted lieutenant. Every alternate private carried a gingall and match, the rest shouldering spears, tridents, or partisans. Here and there on the hillside a long spear flying a white or red banner outside a hut indicates where a sentinel is, or should be, on the alert against the predaceous wild-men.

Many of the subject Lolos along the border are soldiers receiving pay from the Chinese officials. Some of the little village-camps we passed through consisted of no more than six or eight contiguous houses, with a miniature street down the middle, the whole protected by a strong wall. The population throughout this part of Chien-ch'ang has a very martial air. Target practice with the matchlock alternates with archery every evening, on an exercise ground outside the wall. The bow practice is of the usual feeble character, the utmost effective range being 50 yards, with a very high trajectory and wild shooting.

At Liao-i-p'u we met a few individuals of a Sifan tribe which lives to the west of Chien-ch'ang. The men are dressed much like the Chinese, but, though intelligent and approachable, seem an inferior race to the Lolos. I learnt from one of them that they do not weave woollen cloth, but buy it from the Lolos—a statement which may be doubted. The same informant told me that his people can make themselves understood, with some difficulty, by the Tibetans at Ta-chien-lu. Pleased with my curiosity, he produced from his breast an amulet written on stout paper, which he said contained his name and certain Buddhist charms. Such an amulet is bought from the lamas by every Sifan, at a cost of about 5*s*. The characters were Tibetan, and I seized the opportunity to air my knowledge of that language—a knowledge confined to the invocation "Mani pami hum," which he at once recognised and repeated.

The Sifan ladies of this district wear a broad conical hat made of cane, with a cotton cover stretched over it. A good deal of cowrie work decorates their bosoms, which are further adorned with thin silver plaques stamped with a central boss and a number of smaller surrounding bosses. In some instances this is suspended from a cloth collar on which are sewn separate bosses resembling beads. In other

respects they dress much like the poorer classes of Chinese women, but do not, of course, distort their feet. They are generally robust and vigorous; I have even seen one or two dames, still youthful, of almost herculean, but yet graceful, physique.

I artlessly asked a Sifan if his people were friendly with the Independent Lolos. He seemed to take deep offence at the question, and walked off muttering, "They rob us, they rob us!"

On the 21st of August the road led us by a series of very steep zigzags up the western mountain side. So severe was the work, and so circuitous the way, that we only made about five miles of direct distance, putting up at Pao-an-ying, a camp-village of 120 good-natured soldier-colonists. The next day we came down a narrow valley between hills, unsheltered by a single tree, and without any habitations except a small camp or two. Here and there a patch of maize was passed, but nine-tenths of the flat grew nothing but weeds and wild flowers. The stillness of the place was most impressive. Chinese valleys are generally full of sound; but here there is no running water to attract small birds, and no branch for the cicada to perch on; the crows, so populous elsewhere, find no provender, and there is no voice of domestic animals. A few Lolo girls bringing in scant burdens of firewood, charcoal, and brown-eared rice, troop timidly along with silent barefooted tread to the distant market-place.

As we neared the frowning crags of P'u-sa-kang, on our left, the valley opened out into the plain of Yueh-hsi Ting, the chief town of this disturbed border district. The level is laid out in rice-fields, but so stony is the soil that it must be difficult for the rice-plants to find space for their roots. The road runs for nearly a mile along a high causeway of stones; the cottages are built with stones and fortified with stone walls. Fences of stones border the rice patches, and great mounds of stones are piled at short intervals all across the plain. But in spite of this lavish expenditure of material, the fields are still covered with the same unfruitful mineral, so closely distributed that at three inches from every stone lies another. We crossed perhaps five miles of this strange deposit, which decreases gradually as the city is neared. The stones range from the size of walnuts to that of pine-apples, and of course are rounded. They have clearly been brought down by intermittent floods of a mountain-stream which rushes down a wide break in the western range.

Three or four torrents of considerable size unite their waters on this plain and combine to form the Yueh-hsi river, which runs down into the wide Lolo valley mentioned above, and after a course of 70 or 80 miles enters the T'ung river under the heights of Mount Wa. One of these streams I ascended to its source, half a mile from the roadside, and found half-a-dozen cascades plunging from crannies in the foot of a hill and joining their forces to make a fullgrown river, 30 yards wide

and two feet deep. One source was a small cavern from which the fish are said to emerge with the water; I can at any rate certify that some of them are seven inches long and of excellent flavour. The head of a second affluent, which runs from under a hill three miles S.S.W. of the city, we failed to discover, having overrun the scent. We had, in fact, gone round the rear of its point of issue. It is narrower, but a good deal deeper, than the first stream, and by native account runs under the mountain in full volume from a lake on the further side.

Yueh-hsi T'ing is administered by a magistrate and a colonel with 750 men under his command. There is also a Lolo chief—T'u-ssŭ—who exercises great influence and holds jurisdiction over the subject Lolos. The city is about 700 yards square, is not thickly inhabited, and possesses no commerce, the produce of the plain being locally consumed. I was told that a few miles to the east there are mines of silver, copper, and iron, which until lately were worked by Chinese, but are now in possession of the free Lolos.

In this dale we passed many Sifan maidens, strapping and exuberant queans whom report calls hussies; this must be said without prejudice to well-conducted individuals; but in general the Sifan beauties suffer greatly by comparison with their Lolo sisters, who are obviously gentlewomen. Many a time we met the tall straight Lolo with his fringed mantle strung from his neck over his left shoulder, his wrinkled face peering curiously at the stranger, as he drives a few small but active and clean-made hill-cattle along the rough road. It is the custom for persons of our dignity to present him with a cup of native wine. The potation is a lengthy process, for if any of his compatriots are present he first passes the cup round, everyone taking two or three infinitesimal sips, and then himself, slowly and with much display of appreciative gustivity, imbibes the remainder interruptedly, holding the cup between drinks close to his beardless chin, and all the while uttering profuse rhetorical thanks to the donor. The following speech was delivered to me on such an occasion:—"Your bounty is infinite. You are heaven; I am earth. I am a civilized Lolo, not like the wild Lolos who are no better than Taiping rebels. I am a *Black-bone*,* not a *White-bone*. I serve nobody. I receive the Great Emperor's pay, and keep the peace. There are three hundred and sixty days in the year, and during that period I eat seven hundred and twenty meals, which comes to the same thing. If I have drunk too much wine, and am overtaken by the rain in that condition, I lie on the hillside in my mantle under my hat, and when I wake I am well."

It was easy to take down the words of this discourse, since the orator repeated it several times, leading me to think that it must be part of a Lolo ballad which he was translating for my benefit into Chinese. He took such exceeding pains to satisfy me that twice 360

* See p. 67.

amount, all things being considered, to 720, that it seemed well to assume an air of conviction if for no other purpose than to acquire further information. I asked him how many moons there are in 360 days. "Twelve," he replied; but when I protested that twelve moons would fall short of that complement, he not only appreciated the difficulty but took up an explanation of its adjustment. "Our teachers," he said, "add a number of days to make the year regular." "But," I asked, "how do they know what the additional number should be?" His ready and perfectly satisfying answer was, "They judge by the time of flight of the wild geese."

Such a system, though not minutely precise, is sound at bottom and must inevitably come right in the long run. But the Lolo proceeded to admit that the arrangement is inexact, and added that his teachers—he employed the word *Hsien-shêng*—possess a more perfect method, the principle of which he confessed he did not understand. His explanation amounted to this:—the limits of the seasons, which, by the way, the Lolos count as two only, summer and winter, are indicated by the rising or setting of prominent stars over peaks or gaps in the hills, viewed from certain fixed positions. If his statement be taken as referring to the place of the sun with regard to such stars, as is almost evident, it means very much what the Astronomer Royal means, when he annually exclaims, "Sun enters Capricornus; winter begins."

There is, however, no *primâ-facie* reason for denying that this isolated people may possess the rudiments or, perhaps, the relics of certain sciences in the rough, since there is no doubt that they have books. "I have seen bushels of books, but was not allowed to examine them," is the expression of a French missionary who has visited their borders. Further on I shall be able to establish the most interesting fact that they possess the art of writing, in a form peculiar, it would seem, to themselves.

What the Lolos are, whence they have come, and what is their character, are questions to which I can only make a very incompetent reply; and it must be premised that it would be very unfair to draw a definite general conclusion from a small number of scattered and embarrassed inquiries at points round their frontier. No description of them exists in any extant work, with the exception of a passage to be quoted further on and a few sentences in Captain Blakiston's book. It may fairly be said that nothing is known of them. They have been confounded with Miao-tzŭ, Man-tzŭ, Si-fan, Yeh-jên, T'u-i, and other such like loose names, indefinite Chinese expressions, mostly contemptuous, and altogether devoid of ethnological significance. "Lolo" is itself a word of insult, of unknown Chinese origin, which should not be used in their presence, although they excuse it and will even sometimes employ it in the case of ignorant strangers. In the report of Governor-General Lo Ping-chang, above quoted, they are called "I," the term

applied by Chinese to Europeans. They themselves have no objection to being styled "I-chia" (I families), but that word is not their native name. Near Ma-pien they call themselves "Lo-su"; in the neighbourhood of Lui-po T'ing their name is "No-su" or "Ngo-su" (possibly a mere variant of "Lo-su"); near Hui-li-chou the term is "Lé-su"—the syllable Lé being pronounced as in French. The subject tribes on the T'ung river, near Mount Wa, also name themselves "Ngo-su." I have found the latter people speak very disrespectfully of the Lé-su, which argues an internal distinction; but there can be no doubt that they are the same race, and speak the same language, though with minor differences of dialect.

The country occupied by the independent Lolos, an area of about 11,000 square miles, is called, in conjunction with a good deal of debateable border, "Liang-shan" or "Ta-liang-shan" (Great Ridge Mountains), a designation which does not mean any particular peak or peaks, or special range, but applies to the whole Lolo region, a district mountainous throughout, and containing a few summits which overtop the limit of perpetual snow.

The word "Black-bone" is generally used by the Chinese as a name for the independent Lolos, but in the mouth of a Lolo it seems to mean a "freeman" or "noble," in which sense it is not a whit more absurd than the "blue blood" of Europeans. The "White-bones," an inferior class, but still Lolo by birth, are, so far as I could understand, the vassals and retainers of the patricians—the people, in fact. A third class consists of Wa-tzŭ, or slaves, who are all captive Chinese. It does not appear whether the servile class is sub-divided, but, at any rate, the slaves born in Lolodom are treated with more consideration than those who have been captured in slave-hunts. Near Fu-lin I met a Chinese youth who had been brought up in servitude by the Black-bones, and had lately made his escape. He admitted without hesitation that he had been well treated and not overworked, but averred that he had always longed to escape. In P'ing-shan, on the opposite side of the Black-bone territory, I sent to the magistrate, requesting him to allow some of the hostages, who are usually detained in his residence, to come to my lodging. Two of them were sent round under an escort, and turned out to be old acquaintances, whom I had visited in their prison-house two years previously. One of their slaves, a Chinaman, attended them in durance, into which they had been inveigled on a pretence of trading, and told me that he hoped to return with them when they were released.

Near Ma-lieh a Chinaman who had escaped from captivity informed me that his condition as a slave had been comfortable enough, and that he had no complaint to make on that score; nevertheless, he preferred his liberty. His masters had tattooed upon his forehead an indelible blue cross, as a mark of ownership. The children they capture are

treated like their own children, and grow up to all intents and purposes Lolos; but adult slaves, recently caught, are liable if recalcitrant to severe penalties, being placed in the stocks by night and very poorly fed. In extreme cases they may be flogged with nettles, a punishment of which the severity may be increased to a fatal result by keeping the lacerations wetted with cold water. When the captives become amenable to discipline their lot is easy; they are tattooed with the mark of the tribe, and then treated in all respects as White-bones. The same informant told me that the Lolos make broad roads, and live in fine stone houses.

It might be supposed that the well-conditioned and generally contented slaves are half-breeds by Lolo fathers and Chinese slave-mothers, but such is not the case. Even the T'u-ssŭ—Lolos who hold hereditary rule over tribes subject to Chinese jurisdiction, and who speak and write Chinese and wear the Chinese official dress—never marry any but a tribeswoman. Many Chinese girls are, of course, carried into slavery, but only for the purpose of providing wives for Chinese bondmen.

When a marriage is arranged between a Black-bone and a damsel of his own degree, the bridegroom invites the bride with her relations to a banquet, which is spread on the hillside. After the festival the bride goes home with her friends, and it is not until after the third wedding breakfast that the happy pair are united. Presents are interchanged, of which it seems that the family of the bride obtains by far the larger share. The following account of the nuptial ceremony was given me by a party of Lolos near Mount Wa, and may be implicitly relied upon. The betrothal is ratified by a present, from the husband's family, of three vessels of wine and a pig. On the wedding morning the parents of the bride assemble their friends, and the ceremony is opened by the bridesmaids with a melancholy song:—"In spite of all the affection and care your fond parents have lavished upon you since the day you were born, you must now desert them; never again will you sit beside them at work or at meals. You will not be nigh to support them when they grow old, nor to tend them when they fall sick. You must leave them, and go away to the house of a stranger." Whereto the bride responds, also in song, broken with bitter weeping:—"Leave them I must, but not by my desire or fault. They must bear with my absence; my brothers and sisters will [illegible]rt them. I go to my h[illegible]band, and my duty will be to he[illegible]ts, not, alas! my ow[illegible]y trouble befall my [illegible]mother, I shall pi[illegible] sure I shall. Sel[illegible] them; but wh[illegible] send for me, an[illegible]me, I will come!"

The antip[illegible]noter of this [illegible]re if the chant is cu[illegible]. But A-[illegible] old Lolo, whose right [illegible]

wild cattle, told me that it is for the most part extemporised, and that he thought the girls could go on for ever if they liked. Other passages of this touching marriage service lament the leave-taking, and give advice to the bride's sisters to be submissive, kind, and gentle. In the mean time the bride is being arrayed in rich garments and gawds of precious metal, and when she is fully decked the final strophe of the bridal wail begins, a lyric dread that the groom and his parents will behave harshly to the parting sister. A crisis of tearfulness ensues, when suddenly the brothers, cousins, and friends of the husband burst upon the scene with tumult and loud shouting, seize the almost distraught maid, place her pick-a-back on the shoulders of the best-man, carry her hurriedly and violently away, and mount her on a horse which gallops off to her new home. The violence is rather more than simulated, for although the male friends of the bride only repel the attacking party with showers of flour and wood-ashes, the attendant virgins are armed with sticks, which they have the fullest liberty to wield. "Probably they do not strike very hard," I remarked; but A-niu replied, "Oh, oh! the sticks are thorn-branches,* and the girls lay about them with all their might."

The husband's family furnish the young couple with horses, cattle, and sheep; the parents of the bride supply clothes, ornaments, and corn—chiefly maize and buckwheat.

Among some of the tribes a ceremony is said to obtain which seems too grotesque to be true; perhaps it is only a game. The bride is perched by her parents on an upper branch of a large tree, while the elder ladies of the family cluster on the lower branches. The ardent bridegroom clambers up the trunk, assailed by blows and pushes from the dowagers, and it is not until he has succeeded in touching the foot of his sweetheart that he is suffered to claim her as his housewife.

When a boy is born he is washed in cold water, and his forehead baptised with cowdung to render him robust and fearless. But the birth of a girl is generally regarded with more satisfaction. Indeed, the women hold a very respected position, and may even succeed to the sovereignty of a tribe. The best guarantee a stranger can find who desires to enter the Lolo hills is a female guide, who before setting out puts on an extra petticoat; by Lolo law a traveller thus personally conducted is sacred. If any serious molestation is threatened, the woman, after giving due warning and formally calling upon all present to witness the act, takes off a petticoat and spreads it solemnly on the ground. There the token remains, with its coloured flounces fluttering in the breeze or reeking in the rain, until the outrage has been fully

* The Lolo thorn, which lines every road side above P'ing-shan, is armed with rows of blood-red points half an inch or more in length, all turned the wrong way, like shark's teeth. In some way which I could not understand it may be used for food.

condoned. The neighbouring chiefs are bound to punish the offenders, and until justice has been done the petticoat is as inviolable as an ambassador's flag. I am also informed that the women are allowed to take part in battles, with the tacit convention that so long as they do not use pointed or cutting weapons they shall not be attacked by male warriors.

Although traders pass freely through the whole country, it is clear that the various autonomous tribes are not very amicably united. A captive among the P'ing-shan hostages told me that his chief, by name Kata, had lately crossed from Lui-po to Ning-yuan; and being asked how many days the journey had occupied, he replied, "Kata had to avoid many enemies (*yuan-chia*), and therefore took forty-four days." Now the direct distance from point to point is only about 80 miles. The same informant, who remembered with gratitude my visit to his prison-house during the time of Mr. Grosvenor's mission, cried out, on being told that I had lately passed the borders of his tribe near O-pien T'ing, "Why did you not let us know? Although we are prisoners, we could have sent word to our countrymen, and I warrant they would not have let you go by without a welcome." "But would they have taken me through their territory?" "Certainly they would; but they could not pass you into the country of their enemies."

It is remarkable that Buddhism does not count a single convert among the Lolos. Their cult, whatever it may be, is fostered by a class of medicine-men, who are held in great reverence and monopolise the art of writing. It is very difficult to elicit a reply to questions regarding their religion, but the following traits, gathered from Chinese who had escaped from bondage, are credible. The deities are consulted by tossing sticks in the air, and examining the positions into which they fall; or by burning mutton-bones, the marks produced by the calcination indicating the fortune, good or evil, which has been decreed. The feathers of a fowl, inserted into a split bamboo and thrown on to the roof of a house, avert evil influences. Sheep, cattle, or horses are slaughtered when a disaster threatens, on a kind of insurance principle —"I am willing to sacrifice this, in the hope of preserving that"—the theory, perhaps, of all sacrifice. Trial by ordeal is common. An article of value having been stolen and the thief remaining undiscovered, the people of the place are assembled by the medicine-men, and a handful of raw rice is served out to every one. A solemn period of mastication follows, after which the resultant is spat out, and a stain of blood on the chewed mouthful infallibly betrays the culprit. It is affirmed that the gums of the guilty bleed, and that a confession always ensues.

The order of succession to property and chieftainship is curious; the youngest son generally succeeds, and after him the eldest.

The following stray notes were collected from the P'ing-shan captives. They compare the world to an open hand: the thumb,

stretched out far from the digits, represents foreigners, the forefinger themselves; the middle finger indicates the Mahommedans, the third the Chinese, and the little finger the Tartars. (Perhaps the thumb was, for the occasion, transferred from Tibet to Europe.) The great Emperor of China is imagined to sit enthroned in the middle of the palm. They worship three deities—Lui-wo, A-pu-ko, and Shua-shê-po, of whom Lui-wo is the greatest; all three live on Mount O. Old people say that the Liang-shan tribes are a branch of the *La-ka* (?) family, and came originally from the west. The first three numerals were formely *tu*, *fan*, *yi*, but have been changed. They procure fine woollen cloth from K'erh-ka-ta, which is not far from Chien-ch'ang Fu (Ning-yuan). Tibet is two months' journey from their tribe; and beyond Tibet lies a foreign country from which goods reach them. They have not been to that country. In 1849 a foreigner dressed like myself, but with long beard and black hair, paid them a visit at a place which is five days' journey from Ma-pien, and gave them 20,000 cash—about sixty-two shillings—for a cow and a sheep. They would like to know what has become of him, as he was very friendly. (I have no idea what this can mean; the French missionaries without exception wear Chinese dress.) Some of their people have red or yellow hair. A chief marries three wives, a sub-chief two, and the common people one. They cultivate wheat, barley, and millet, and make wine of these, but grow very little rice. They use knives and forks, and eat beef, mutton, and pork, but not horse or dog-flesh. They make their own swords, three and a half to five spans long, with square heads, and have bows which it takes three men to draw,* but no muskets. Their women wear pleated petticoats, ornaments of silver and gold, and embroidered shoes. Hearing that foreigners possess instruments which indicate the time of day, they would be glad to obtain a specimen.

There is much in the free-hearted manner of these Lolos to attract the traveller, and more in the interest which attaches to so original or aboriginal, a people. Possessed as they seemed to be with half an idea that I was akin to their race, they were everywhere curious to see their far-away tribesman. A European could doubtless stroll over the length and breadth of their meads and mountains in complete security; but he must be furnished with references; an introduction *en règle* is indispensable. They appear to keep a wary watch along their border, and the character of a visitor is soon appreciated at its true value. Should he belong to the category of honest folk he will find no difficulty in crossing the frontier, unless it be from Chinese officials.

Whatever may be the difference between the subdivisions of Lé-su and Ngo-su, it is impossible to deny that they belong to the same family. Physique, manners, and language, all correspond. It is most noteworthy

* See this from a Chinese drawing in 'Marco Polo,' Bk. ii. ch. xlix.—[H. Y.]

that the term *Lé-su*—or some variant of it—is nationally used by several tribes in this part of Indo-China, widely separate from one another both in the geographical and other senses. I find in the work of Abbé Desgodins an account of a people whom he names *Lissou*, inhabiting the region immediately south of Tibet, and to whom he attributes a very independent character. He adds that their language differs wholly from those of the numerous tribes by which they are bordered. Again, in the valuable journal kept by Dr. Anderson of his experiences with the Sladen Mission, mention is made of a people whose tribal name he writes *Lee-saw*, and whom he proposes to identify with the "*Lei-su*" encountered on the Tibetan border by Mr. Cooper. The Doctor's description of his "Lee-saws" as "a small hill people with fair, round, flat faces, high cheek-bones, and some little obliquity of the eye," differs *toto cœlo* from the tall, oval-faced, Aryan-like race I saw on the Chien-ch'ang border. Nor is the resemblance between Mr. Cooper's friends and the Lolos any more striking.

But Dr. Anderson finds great similarity between the language of his Lee-saws and the Burmese. The obvious experiment is therefore to compare the Lee-saw numerals, as recorded in his work, with those of the Lolos, as below:—

| | Lolos (near Wa-shan) | Lolos (near Ma-pien) | Leesaws (of Dr. Anderson). |
|---|---|---|---|
| 1 | Ts'ụ .. .. .. .. | Tchih .. .. .. | Ti |
| 2 | Ni .. .. .. .. | Ni .. .. .. | Hnuit |
| 3 | Su .. .. .. .. | Su .. .. .. | Sa |
| 4 | Erh .. .. .. .. | Li .. .. .. | Li |
| 5 | Ngụ .. .. .. .. | Ngụ .. .. .. | Ngaw |
| 6 | Fo .. .. .. .. | K'u .. .. .. | Chaw |
| 7 | Shih .. .. .. .. | Shih .. .. .. | Tshe |
| 8 | Shie .. .. .. .. | Hei .. .. .. | Hay |
| 9 | Gu .. .. .. .. | Gu .. .. .. | Koo |
| 10 | Tch'ie (or Ts'e) .. .. | Tch'e .. .. .. | Tsi |
| 11 | Tch'i-tsụ .. .. .. | Tch'i-ti | |

By which it appears that they are nearly identical. Therefore—but it would be rash to draw conclusions; it is only safe to assert that future explorers will do well to collect further materials.

The speech of the Independent Lolos is harsh, abounding in gutturals and strange vibrating consonants. The Welsh aspirated *l* frequently occurs, as in *hlopọ* (moon), but it is not so easy to aspirate an *n* as in *hnabé* (nose). There is a labial sound which might be written *burburu*, pronounced as if the speaker were shivering with cold, and which is not difficult to imitate; but when the same process of shuddering has to be applied to a lingual, as in the word for *iron*, which I have despairingly written *shu-thdhru*, an English tongue is dumbfoundered. Happily for strangers these odd vocables are freely modified into much simpler sounds without danger of misapprehension.

The following short vocabulary was collected among a small tribe of subject Lolos living on the left bank of the T'ung river, from whose pronunciation much of the primitive uncouthness has disappeared. A parallel column gives a corresponding vocabulary of the language spoken by the Sifans of Tsu-ta-ti. It will be observed that both peoples use Chinese terms for certain natural products; but it should not on that account be hastily concluded that such articles are not indigenous. The Sifans, for example, employ the Chinese name for rhubarb, although that salutary plant is almost exclusively a Sifan export.

| | Sifan (properly Mekia) of Tsŭ-ta-ti. | Lolo of Left Bank of T'ung River. |
|---|---|---|
| 1 | Tụ | Ts'ụ |
| 2 | Nụ | Ni |
| 3 | Si | Su, or Soa |
| 4 | Jro | Erh |
| 5 | Ngei | Ngụ |
| 6 | Tch'u | Fo |
| 7 | Shụn | Shih |
| 8 | Jih | Shie |
| 9 | Ngo | Gu |
| 10 | Tch'i-tch'i | Tch'ie, or Ts'e |
| 11 | Th'sụ-tụ | Tch'i-ts'ụ |
| 12 | Th'sụ-nụ | Tch'i-ni |
| 16 | Th'sụ-tch'ụ | Tch'ie-fo |
| 20 | Nụ-tsụ | Ni-ts'e |
| 21 | Nụts-tụ, or Nụts-la-tụ | Ni-ts'e-ts'ụ |
| 30 | Si-tsụ | Soa-ts'e |
| 32 | Si-tsụ-nụ | Soa-ts'e-ni |
| 40 | Jro-tsụ | Erh-ts'e |
| 43 | Jro-tsụ-si | Erh-ts'e-su |
| 100 | Ta-jia | Ts'ụ-ha |
| 104 | Ta-jia la jro | Ts'ụ-ha ni erh |
| 109 | .. | Ts'ụ-ha ni gu |
| 130 | Ta-jia si-tsụ, or Ta-jia la si-tsụ | Ts'ụ-ha-soa-ts'e |
| 197 | Ta-jia la ngo-tsụ-shụn | Ts'ụ-ha-gu-ts'e-shih |
| 800 | Jih-jia | Shie-ha |
| 1000 | Tụ-to | Ts'ụ-tpro |
| Three horses | Mo si-bu | M k'o soa-ma |
| | | |
| I | A | Ngo, or Nga |
| Thou | Nụ | Ni |
| He | T'ụ | Ts'ụ, or Ha-diu |
| We | Ao | |
| You | Nu | |
| They | T'ou | |
| Mine | Ei | Ngo-be |
| Thine | Ni | Ni-be |
| His | T'i | Ha-diu-be |
| Ours | Ao-wo | Ei-wo |
| Yours | Nu-wo | or Ni-wo |
| Theirs | T'ou-wo | T'i-wo |
| This horse | Mo t'ụ-bu | M ts'ụ-ma |

| | Sifan (properly Mekia) of Tzŭ-ta-ti. | Lolo of Left Bank of T'ung River. |
|---|---|---|
| That horse | Mo p'ai-t'ụ-bu | M ha-di-ma |
| Here | Kwan-p'ụn | Ts'u-ku |
| There | Wan-p'ụn | Ha-du-ku |
| What | Ha-ma | K'e-tch'e-ma |
| Who (what man) | Ha-ma ssụ | K'e-ts'u-ma |
| Where (what place) | Ha-ma me-li | |
| When (what time) | Ha-ma tụ-kụ | K'a-t'i |
| Whither are you going? | Ha-da i-gụ | K'a-yi |
| Whence do you come? | Ha-da wa-la | K'a la |
| Come here! | T'ụ-k'ụ-la | Ts'u-ku la |
| Go away! | Nei-i | Ta-sho |
| Man | | Ts'u |
| Place | | Mi-di |
| | | |
| One year | Tụ tu-tch'e | Ts'ụ koa |
| One month | Tụ ha | Ts'ụ bu la |
| One day | Tụ niu | Ts'ụ nien |
| Yesterday | Ya-niu | A-ni-di |
| To-morrow | So-niu | Shih-ta-di |
| To-day | | I-ni-di |
| Last year | Ya-hei | A-hei-o |
| Next year | So-hei | Nie-ho |
| Morning | Dja-ma-tch'e | Tchih-gu dji-ti-ko |
| Evening | Mụn-k'we | Dja-gu dji-ti-ko |
| Noon | Mjo-dzụ-she | M-erh-ko |
| Night | K'we | M-k'e-ko |
| Spring | Mụn-dsie | Ts'ụ-la |
| Summer | Mụng-a | |
| Autumn | Mụ-to | Mu-ts'ụ |
| Winter | Mụ-tsụ | |
| Sun | Ni-ma | He-bu-shio |
| Moon | Ha-pụ | La-ba |
| Star | Tchih | Mu-tchio |
| Cloud | Djie | Mu-nie |
| Rain | Ngwa-la | Ma-ha |
| Snow | Yi | Wo |
| Wind | Mụr | Mụr |
| North | Tchian-tch'o | |
| South | Llo-tch'o | |
| East | Sha-tch'o | Bu-du |
| West | No-tch'o | Bu-djie |
| Sky | Mụ | Mu-mie |
| Fire | Mie-p'u | Mu-to |
| Water | Djo, or djui | I-gu |
| Hill | Mbie | Buia |
| River | Yin-djro-ma | Nui |
| Stone | Lo-k'wa | Lo-mo |
| Earth | Za-pi | Mi-di |
| Wood | Sie | Ssụ-lo |
| Gold | *N$^{2}$ | Shih |
| Silver | Mwe | Tch'uo |

* The small numerals indicate the "Tones." See p. 78.—[W. G.]

| | Sifan (properly Mekia) of Tzŭ-ta-ti. | Lolo of Left Bank of T'ung River. |
|---|---|---|
| Iron | She | Shu-thdhru |
| Copper | Nuo[2] | |
| Lead | Hie | |
| Tin | Hie | |
| Bone | Ro-ku | Shih-wo |
| Grass | Ndzu[2] | Jih-pa |
| Rice | Tch'e | Dze-tch'uo |
| Raw rice | N-tch'e | |
| Maize | Yi-mi (Chinese?) | Yi-mi-dzu (Chinese?) |
| Tobacco | Pi-tch'a | Ta-ba (Mapien dialect) |
| Barley | Mu[2]-dza[2] | Zo |
| Wheat | .. | Sha |
| Rhubarb | .. | (Chinese) |
| Silk | .. | (Chinese) |
| Opium | .. | (Chinese) |
| Mulberry | .. | Bbu-dza |
| Potato | .. | (Chinese) |
| Cotton | Names borrowed from Chinese | (Chinese) |
| Hemp | Names borrowed from Chinese | (Chinese) |
| Nettle | .. | Du-p'u |
| Turnip | .. | (Chinese) |
| Carrot | .. | (Chinese) |
| Lettuce | .. | |
| Onion | .. | |
| Tea | Dja-tcha | La |
| Willow | Mbo-u | Mo-shoa |
| Bamboo | He-ka | Ma-tchie |
| Buried pine | Tchu-si | |
| Wine | Wo | Djih |
| Cow | Mwe | Lu, or Lugh |
| Dog | Tch'o | K'e |
| Goat | Tch'i | Tch'i |
| Pig | Rgo | Wo[1]-pa (male), Wo[1]-ma (female) |
| Fowl | Rga[1] | Wo[4] |
| Duck | Nta-tsu | E-pu (male), E-ma (female) |
| Sheep | Yo | Yo |
| Yak | Rga[1] | |
| Hare | Mi-dzu | T'a-la |
| Rat | Gu | He |
| Snake | Bur | Vu |
| Monkey | Mi | A-nuo |
| Tiger | La | La |
| Dragon | Ri-dji | Luo |
| Bird | .. | A-tsu |
| Fish | .. | Hai-yi |
| Hawk | .. | Tchuo |
| Sparrow | .. | A-tchao |
| Pigeon | .. | Si-atsu |
| Musk deer | Lie | Lu-pu (male), Lu-ma (female) |
| Wolf | Ndzu[2] | Viu |
| Fox | .. | Mie-guo |
| Leopard | (Same as Wolf) | Zu |
| Bear | Rge | Wo (in a deep tone) |

| | Sifan (properly Mexia) of Tzŭ-ta-ti. | Lolo of Left Bank of T'ung River. |
|---|---|---|
| Father | A-ba | A-ta' |
| Mother | A-ma | A-ma |
| Elder brother | A-dja | A-mu |
| Younger brother | N-a | E-ni |
| Sister | Hei-ma | A-ye |
| Husband | Si-p'a | Bui-dji |
| Wife | Ma-mu | Si-ma |
| Son | Yi-za | Zi-e |
| Daughter | Zi-e | A-mi-zie |
| Father's elder brother | A-ba-k'wa | A-bi |
| Father's younger brother | Bei-ka | A-niu |
| Father's elder sister | A-ma-k'wa | A-bu |
| Father's younger sister | N-dza-ma | Bo-ka |
| Grandfather | A-pu | A-p'u |
| Grandmother | A-wa | A-wa |
| Grandson | Lụ-tchụ | Erh-yi |
| Granddaughter | Nza-lụ-tchụ | Erh-ma |
| Nephew, or niece | Ndjih-yi | |
| | | |
| Head | We-li | A-tch'e |
| Hair | Tchi-wo | Djih-p'o |
| Eyes | Dụ-ku | Ni-ssụ |
| Nose | Shụm-bu-ka | Ne-bi |
| Mouth | Shụm-p'a | K'a-p'ien |
| Ears | Ni-p'e-tcho | Na-bu |
| Throat | Tao-ka | Li-wu |
| Lips | Shụm-p'a-ndjro-pi | Mu-p'u |
| Teeth | Fu-ma (incisors) | Djih-ma |
| „ | Fu-k'wa (molars) | |
| Tongue | Shih-pụ-tcho | Shie |
| Chin | Mo-ho-ge | Ma-dji-tch'i-li-ma |
| Arm | Lụ-tsa | Lu-bu |
| Hand | Lụ-pa-ka | Lo |
| Finger | Lụ-shih-ka | Lo-tchi-ze |
| Finger-nail | Lụ-dzụ | Lo-si |
| Thumb | Lụ-ma | Lo-ma |
| Forefinger | Lụ-tch'e | |
| Middle finger | Lụ-shụn-dzụ-mo | |
| Third „ | Lụ-dji | |
| Little „ | Lụ-ntch'u-pụr | |
| Body | Kwo-pa | Dji-shi-lo |
| Breast | Ro-k'u | Di-gwa-ma |
| Back | Ga-ma | Ko-pu |
| Heart | Shụm-bu | He-ma |
| Belly | Yi-p'a | Ha-ma |
| Leg | Bu-bu | Bbu-sa-ma |
| Foot | Erh-p'ụ | Tch'i-shi |
| Sole | Erh-pu-tchuo | |
| Toe | Erh-shih-wo | Shi-ma (great toe)<br>Shi-tchi-ze (other toes) |
| Toe-nail | Erh-dzụ | Shi-si |
| Heel | Erh-gu-bu | K'a-twa-ma |
| Skin | Rjo-shụ-ndjro-pi | Dji-dji |
| Flesh | Shih | Shi-ni |

| | Sifan (properly Mexia) of Tzŭ-ta-ti. | Lolo of Left Bank of T'ung River. |
|---|---|---|
| Plough | Du-ge | Ssŭ-gu |
| Hoe | Dzŭ-pu-tchuo | Tzŭ-ma |
| Axe | Wo-tsa | Wu-ma |
| Saw | Sa-di | Sho |
| Bow | Si-le-ka | He-ma |
| Quiver | | He-bu |
| Sword | Mbŭ-tcha | Dji-mi |
| Spear | Ndji-ka | |
| Gun | Ni-tch'u | Tch'u |
| Flint | Tcha-ma-lo-k'wa | Mie-go-lo-mo (tinder-stone) |
| Drum | Kun-djie | Ko-dzŭ (Chinese) |
| Arrow | Me-ka | |
| Flute | Shih-he | Do-ge |
| Boat | Lo-ge | Lo |
| Rope | Be-ka | Djia-pa |
| Paper | Sho | T'ao-wo |
| Book | Jŭn-te | T'ao-shu-pe |
| Basket | | T'i-tu-dzŭ |
| Oil | Jih-yi | |
| Salt | T'sŭ | |
| Blood | Shuo | Ssŭ |
| Clothes | Ga-ma | Tch'ü-ti |
| Coat | Ya-she-tch'a | K'a-dzŭ |
| Trowsers | Za-tsa | Wo-ye |
| Hat | Mbo[2] | Tcha-mo |
| Shoes | Zŭ | Shih-nie |
| Black | Da-na | A-no-so |
| White | Dŭ-lu | A-tchü-so |
| Red | De-nie | A-ni-so |
| Green | La-mi | A-lu-so |
| Blue | Da-ba | A-wu-so |
| Yellow | Dŭ-sho | A-shih-so |
| Good | Ya-lie, or Yan-dŭ | Bei-so, or Bui-so |
| Bad | Ma-lie, or Man-dŭ | A-bei-so |
| High | Yam-bo | A-mo-so |
| Low | Ya-nie | E-hi-so |
| Long | Ya-she | A-shie-so |
| Short | Ya-djo | E-nu-so |
| Thick | Ya-du | A-tmbu-sho |
| Thin | Ya-bu | E-bu-sho |
| Near | Mbwe-sha | (Same as "short") |
| Far | Ya-rgo-she | (Same as "long") |
| Fast | Yan-tch'e | Kwo-tch'a |
| Slow | Di-wa | A-li-a-li |
| Old | K'wa-k'wa | Mu[3] |
| Young | P'u-za | So-lie |
| Big | Ya-k'wa | I-su |
| Little | Yie | Dji-su |
| Strong | Sho-mo-ya-djo | Wo-ni-ko |
| Weak | Da-ma-shia-tŭ | P'a-ko |
| Handsome | Yan-tch'uo | Sü-erh-te-ko |
| Ugly | Ma-sha-nga | Shih-la-te |

| | Sifan (properly Menia) of Tzŭ-ta-ti. | Lolo of Left Bank of T'ung River. |
|---|---|---|
| Clever | Yan-tch'e-tụ | O-dji |
| Stupid | Man-tch'e | Sụm-sụ-la-djo |
| Awkward | Ka-tụ | |
| Rich | Ya-bo | Su-ga-so |
| Poor | Ma-bo | So-sha |
| Dead | T'o-shwa | Ssụ-wo |
| Alive | Dụn-so | Dju-so |
| | | |
| Sifan (themselves) | Lo-ssụ | O-dzuo |
| Tibetans | Ndo-a | La-ma |
| Chinese | Ndzi | Ha-ga |
| Lolos | Na-p'a | Ngo-so (i. e. themselves) |
| Mup'ing Sifan | | Tu-puo |
| | | |
| Come | La-mu | La |
| Go | Yi | Yie |
| Eat (as food) | Ngụ-dzụ | Do |
| Eat (as tobacco) | Ngụ-tche | |
| Drink | Ngụn-tche | Shi-do |
| Sleep | K'o-me | E-djo |
| Beat | Na-ka | Dduo |
| Kill | K'o-tchuo | Sie |
| | | |
| This man is good | T'ụ-ssụ-bu Yan-dụ | T'su ts'ụ-ma bui-ko |
| This man is better than that | T'ụ-ssụ-bu P'ai-bu Tch'u Yan-dụ | Ts'u ts'ụ-ma ha-di-ma kwa-dzụ |
| These two men are very bad | T'ụ-ssụ-nụ-bu Ya Man-dụ | Ts'u ts'ụ-ni-ma a-bei |
| That man is bad | | Ts'u ha-di-ma a-bei |
| This horse is faster than that | T'ụ-mo P'ai-mo Tch'u Yan-tch'e | M ts'ụ-ma ha-di-ma kwa-dzụ dzụ-shuo |
| | | |
| To drink tea | | La shi-do |
| To smoke tobacco | Yi-tch'a ngụ-tche | |
| I want to sleep | A k'o-me | Nga e-djo-go |
| I will come to-morrow | A so-niu la | Nga shih-ta-di la |
| He beat me yesterday | T'ụ ya-niu a-wa na-ka | Ts'ụ a-ni-di nga dduo |
| Don't beat me | A-wa na-t'a-ka | Nga t'a-dduo |
| Don't kill him | T'ụ-wa k'o-t'a-tchuo | |

In writing the above sounds Sir T. Wade's method has been followed, with the necessary extensions. The vowel *e*, however, is to be pronounced like a French accented *e* (*bébé*), and the vowel *u* with a dot below (ụ), like *u* in the English word "but." *Rg*, in Sifan words, is a guttural *r* with a *grasseyement*.

Both Lolo and Sifan have tones. In a few cases these have been indicated according to the Pekinese scale.

All the way from the T'ung there is no break in the western hills, under the brow of which the road for the most part runs; but near Yueh-hsi it becomes evident that these hills are merely the offshoots of the Cheh-to range, the boundary wall of Tibet. Northwest, or thereabouts, of Yueh-hsi rises a snowy peak which may be regarded as a corner of the Tibetan plateau, since south of it there are no conspicuous

mountains in the line of the range. I only obtained a very fleeting view of it, and even then the summit was hidden by a mass of cumulus; but as the snow-line lay far down the mountain at the hottest time of the year the height of its culminating peak* cannot be much less that 18,000 feet.

The valley of Yueh-hsi opens southward into the territory of the Black-bones, touching their confines at some 15 miles from the city. Our object being to follow the highroad, we edged round the spurs of a high confused mountain-mass, full of gullies and chasms, and turning up a narrowing glen reached the fortified outpost of Hsiao-shao ("little guard"). As we left the main valley, we left cultivation and cottages, and it is evident that caravans hurry through the glen, for at a temporary booth in which we breakfasted we could only procure rice enough for half our party. Hsiao-shao lies at the foot of the Little Hsiang-ling Pass, the most elevated point of the Chien-ch'ang road. The col has an elevation above sea-level of 9800 feet, and though a few hundred feet higher than its "Great" namesake, is easier of ascent. The hillsides are broken up into the precipitous wooded bluffs which Chinese artists delight to portray. Black-bone incursions seldom cross the range, the strong walled camp of Teng-hsiang, 2100 feet below the summit, effectually closing all access down the gorge to the rice-plain of Mien-shan. We were escorted by squads of well-clothed soldier-colonists, and by a pair of trumpeters, whose blasts echoed impressively down the ravines, and every little sentinel blockhouse returned a salute of three gingalls, to the great discomfort of my mule, which at each discharge seemed to apprehend a Lolo foray and threatened to upset me, loosely mounted on a packsaddle, into the profuse nettle-beds which border the track. On the 25th we continued the descent to Mien-shan, a flourishing little town at the junction of two valleys which yield copper and iron (manganese ore). We met several loads of the latter coming in from the mines.

A small river here runs out of Lololand through an open vale and joins its waters with the torrent which had accompanied us from the top of the pass. We followed the united stream through the narrowest conceivable gorge by a path which in one place is excavated, parapet and all, in the face of the precipice, high above the foaming waters, and is closed moreover by solid gates—the pass, in fact, which Shih Ta-k'ai found occupied and did not attempt to carry.† A little further on, the tortuous ravine opens, suddenly, into the main valley of Chien-ch'ang at the important town of Lu-ku (or Lo-ku), a customs and Likin station for the collection of dues on cotton cloth, Yunnan opium, and many other

* The peak bore nearly due west from my station, so that its latitude, as laid down on the chart, is fairly correct; but as I never caught sight of it again, its longitude is only estimated.

† See p. 57.

articles—it would be nearly safe to say *all* other articles. The trade in foreign cottons is insignificant, the native fabric imported viâ Ya-chou being far more suitable to local demand. The principal Lu-ku firm annually distributes 5000 bales of Eastern Chinese cloth, each bale containing forty-eight pieces 30 feet long. The bales cost about Tls. 14 in Hankow, and by the time they have reached Lu-ku they have paid two taels for duty and Likin, and about the same amount for carriage. The average sale at Lu-ku is Tls. 18 per bale, by which it appears that the profit on an outlay of some 20,000*l.* is exactly *nil*. But any one acquainted with the conduct of native trade will easily guess the solution of the mystery, which is that the exchange of silver and the difference of weights and measures is greatly in favour of Lu-ku. These differentiations give the traders a profit of five or six per cent; but most of the import is exchanged for Yünnan opium, a staple which yields a far more gratifying remuneration.

Chien-ch'ang proper, which we have now reached, is a valley, or perhaps plain, lying due north and south, a degree of latitude in length, and, on the average, about three miles broad. The Anning river, an impetuous, shallow, and unnavigable stream, runs down its whole length in a sandy and shingly bed. The mean level of the valley is nearly 5000 feet above sea, and in the course of 50 miles it falls about 900 feet. The steep and high mountains which form its eastern wall, breached only at Ning-yuan Fu, are the home of the Black-bones, while its western boundary is a system of lower, less abrupt, and less wooded ranges, inhabited partly by Chinese and partly by a great variety of indigenous tribes (Sifan, or Mantzŭ), subdivisions of the Tibetan race. Besides being the habitat of the famous wax-insect, the valley and its lateral ravines are reputed to be exceptionally fertile, producing all crops from buckwheat to rice. Its fruits also are unusually large and delicate. Soon after passing Lu-ku we saw crops of a gorgeous purple plant, a cereal called locally "Mantzŭ Hsü-mi"; sunflowers are very extensively cultivated, and it is curious to see their golden faces, eight or ten inches broad, all turning persistently to the east. The cactus is common from Lu-ku downwards, but is not so large or abundant as on the Upper Yangtzŭ above P'ing-shan, where it is used for fencing fields, and even villages.

The discreet and observant gentleman who came this way from Venice six hundred and odd years ago, has recorded that after travelling several days over high mountains he entered a level country, called "Caindu," in which there are many towns and villages. There can be no doubt that by Caindu he means this valley. Colonel Yule, whose admirable edition I can only quote from memory, sees in the word Caindu a variation of "Chien-ch'ang," and supposes the syllable "du" to be the same as the termination "du," "do," or "tu," so frequent in Tibetan names. In such names, however, "do" never means a district,

but always a confluence, or a town near a confluence, as might almost be guessed from a map of Tibet. Ta-chien-lu is a case in point, and serves at the same time to illustrate the formation of a myth. As written in Chinese, the term means "arrow-forge," and successive travellers relate the various explanations by which the Chinese attempt to account for the expression. Abbé Huc gives one version; Captain Gill—small blame to him—another; and my own notes contained a very romantic story on the subject. But I have since learnt that "Ta-chien-lu" is merely the Chinese transliteration of the native name "Tar-tsen-do," which means "confluence of the Tar and the Tsen," the two streams which unite at that place.*

Unsatisfied with Colonel Yule's identification, I cast about for another, and thought for a while that a clue had been found in the term "Chien-t'ou" (sharp-head) applied to certain Lolo tribes. But the idea had to be abandoned, since Marco Polo's anecdote about the "caitiff" and the loose manners of his family could never have referred to the Lolos, who are admitted even by their Chinese enemies to possess a very strict code indeed of domestic regulations. The Lolos being eliminated, the Sifans remained; and before we had been many days in their neighbourhood, stories were told us of their conduct which a polite pen refuses to record. It is enough to say that Marco's account falls rather short of the truth, and most obviously applies to the Sifan. A succinct expression of Chinese opinion is contained in the border saying "Chên-chieh Lolo; kou Sifan," where *chên-chieh* means lady-like reserve, and *kou* broadly hints its antithesis. It has already been remarked that *Sifan*, convertible with *Mantzŭ*, is a loose Chinese expression of no ethnological value, meaning nothing more than western barbarians; but in a more restricted sense it is used to designate a people (or peoples) which inhabits the valley of the Yalung and the upper T'ung, with contiguous valleys and ranges, from about the twenty-seventh parallel to the borders of Koko-nor. This people is subdivided into eighteen tribes, the names of which according to Tibetan pronunciation are as follows:—

| | | |
|---|---|---|
| 1. Djia-la. | 7. So-mung. | 13. Tchra-tin. |
| 2. Djum-ba. | 8. Djiu-tsé. | 14. Ma-zu, or Ma-zé. |
| 3. Djia-k'a. | 9. Zur-ga. | 15. K'ung-sar. |
| 4. Wo-jé, or Go-jé. | 10. Tchro-shiop. | 16. Pé-ré. |
| 5. Rap-ten and Tsen-la. | 11. Gé-shie. | 17. Tchran-go. |
| 6. Tam-ba. | 12. Pa-ung. | 18. Djé-gu. |

Djia-la is the native name of the district ruled by the King of Ta-chien-lu, whose style is *Djia-la Djie-po* (King of Djia-la). His

* Horace Della Penna, in his account of Tibetan countries, makes allusion to the state, or city, of Tar-chen-ton, which supplies the whole of Tibet with tea, and lies on the confines of China. It is evident enough that Tar-chen-ton is Tar-tsen-do, alias Ta-chien-lu, the great entrepôt of the tea-trade between Ssŭ-ch'uan and Tibet.

What is said in the text regarding the etymology of Ta-chien-lu, &c., corroborates the suggestions made in notes to Captain Gill's work. See "Introductory Essay," p. [88], and vol. ii. p. 77.—[H. Y.]

Chinese title is *Ming-chêng-ssŭ*, which, if it is to be translated, means "Bright-ruling official." *Djum-ba* is better known to foreigners by its Chinese name of Mu-p'ing. *So-mung*, near Sung-p'an T'ing, may perhaps be identified with Captain Gill's *Su-mu*. Tibetan, or a dialect of Tibetan, is the language of Djia-la and of the last five in the list. Djum-ba possesses a language of its own, and in the rest another different language is spoken. In *Gé-shie*, however, Tibetan is generally understood. The Tibetan alphabet is employed in all.

The tribes numbered from 2 to 13 (Djum-ba to Tchra-tin) extend northwards from Ta-chien-lu to Koko-nor; but Djia-la and the last five, Tibetan-speaking tribes, form a separate division under the general name of *Ménia*, and inhabit, roughly, the valley of the Yalung river. Menia appears in some European maps of the region under the form "Miniak," doubtless the same word; in pronouncing Tibetan many written consonants are suppressed;* the "Bos Grunniens," for instance, otherwise the Yak, is called "Ya" by natives. It will also be found that the Yalung is named on some maps the Minia-chu—Minia river. Again, the native Chinese map applies the name of *Me-li-na-ka* to the territory west of Chien-ch'ang between the Yalung and the Wuliang; but it is possible that this term refers to the country of *Meli*, a distinct region.

Although the main valley of Chien-ch'ang is now principally inhabited by Chinese, yet the Sifan or Menia people are frequently met with, and most of the villages possess two names, one Chinese and the other indigenous. Probably in Marco Polo's time a Menia population predominated, and the valley was regarded as part of Menia. If Marco had heard that name he would certainly have recorded it; but it is not one which is likely to reach the ears of a stranger. The Chinese people and officials never employ it, but use in its stead an alternative name, *Chan-tu* or *Chan-tui*, of precisely the same application, which I make bold to offer as the original of Marco's Caindu, or preferably Ciandu. (See note on the Sifan tribes.)

It was a pleasant change, after the rugged mountain passes, to travel along the broad level vale to Li-chou, a small sub-magisterial city, with a new wall environed by flourishing farm-houses and well-conditioned temples—a city where few are very rich and none absolutely poor. We saw many people clothed in rags, of which they were not ashamed, explaining that they wear their old suits in summer, but possess better garments for the cold weather. Rice and maize are so abundant and so little exported that no one is enriched and no one starves. There is a traffic in goat-skins from the hills, in wax-insects, and of course in

* The name of the town of Darjeeling, well known to Tibetans, is a good example. In Eastern Tibet it is pronounced *Do-gie-lin*, but is written *Rdo-rgie-glin*, meaning "Diamond Country." Western Tibetans, on the other hand, read *T'u-gie-lin*, but write *Stod-rgias-glin*, which means "High Broad Country."

opium, but the whole export amounts to very little. The carriage business, for which Li-chou is the chief station on the highway between Hui-li-chou and Yachou, affords employment to a great part of the inhabitants. Seven or eight miles further on we came to Ning-yuan Fu, the capital of Chien-ch'ang, built on the northern slope of a lateral valley which has been the scene of two calamitous visitations. During the early part of the Ming dynasty the present lake, it is said, had no existence, but was a dry hollow, in which the city lay surrounded by forest. A sudden earthquake, says tradition, shook the place to fragments, and a rush of water from underground converted its site into a lake; after which cataclysm, the forest was cleared and a new city built in the present position. However much precision the tale may lack in date and detail, it is rendered credible by what occurred in the autumn of 1850 (30th year of Tao-kuang, 8th moon, 7th day), when an earthquake threw down two-thirds of the buildings, and even those which remained standing were for the most part wedged up and buttressed by the surrounding débris. The crisis was preceded by a month's continuous rain. Soon after the cessation of the culminating shocks the ruins of the city took fire. It is asserted that only one house remained whole, and that from 15,000 to 20,000 persons perished, but such statements are always grossly exaggerated. Here is the account given me by a survivor:—

"At about ten o'clock in the evening I was asleep in bed. It had been raining very heavily. On the two preceding days shocks of earthquake had occurred, but not violent enough to throw down houses. The second shock was accompanied by a roar like that of a hurricane. When the great shock came I woke up and felt my bed rolling about like a boat in rough waves; the roof of my house was giving way, the tiles were falling on me, and the walls were heaving and bending. I heard the scream of the people in the Examination Hall, and ran out to help the wounded. I suppose I ran out because my roof was falling; but I was dreadfully frightened and did not understand what had happened until I heard the shouts of the neighbours. I found the Examination Hall overthrown, and assisted in rescuing about thirty persons, but not less than fifty had met their death and lay under the ruins. I then went with the neighbours to help such people as might still be alive under the fallen houses. Most of the deaths occurred in private dwellings. Two families, my relations, one of six persons, the other of eight, were crushed every one. I am quite certain that a great deal more than half the population perished. Fires broke out almost immediately in several places, but were kept down by the rain. Widows and orphans, drawing relief from the granaries, did not suffer much on the score of hunger; but while the fires were burning a sudden cry was raised that the Lolos were coming, and although it was false, more than 200 people, principally terrified women, ran into the flames

or drowned themselves. I was at the time, and still am, a doorkeeper of the Examination Hall. I spent the greater part of the next day or two between the walls of my roofless house, warming myself—for it was cold and wet—by burning the beams and rafters, and overcome with great fear. Soon, however, mat sheds were put up outside the city, in which we took refuge. During the four or five days which followed the calamity the ground continued to heave at intervals, so that water jumped out of the water-butts. At every fresh shock the folk ran out of the sheds, fearing to be crushed by their fall, but very foolishly and unreasonably, since the light pole-work and matting could not have hurt any one, and they did not hesitate to sleep under them. The fact is that everybody was giddy and trembling and scared. Many of the dead were buried by their families, but most were laid together in a great pit outside the wall, where I think I helped to bury 300,000 or 400,000 corpses."

In spite of his absurd notion of number, the old man's story is terrible enough. He added that the houses were soon rebuilt, as well as part of the city wall which had been overturned. The place is neither large nor populous, and, lying some distance from the high road, has very little commercial importance. The interior is fairly clean and neat, owing, no doubt, to its having been so recently rebuilt, but the suburb is thin and mean. The circuit of the walls—about three miles, the regulation ten *li* and three *fên*—encloses a good deal of open space.

Goitre is extremely prevalent in this part of the valley, especially among the women. We saw very few cases before reaching this point.

The weather having been unfavourable for sextant work, I took advantage of a change for the better, and of unusually convenient quarters in the Examination buildings, to halt for a day or two. But there was a more special reason for prolonging my stay. A couple of months before our visit a French missionary, the only European besides myself who has ever entered the city, was driven away by the staves and stones of a mob instigated by the Commandant. My arrival, directly protected as I was by a new and determined Governor-General who had already shown his subordinates that the law, which in China means the Governor's fiat, possessed a strong if not a violent arm, was calculated to put the gallant Commandant in a desperately false position. Having publicly given out that he would never allow a foreigner to pass the city gates, and having incited his myrmidons to lapidate the lonely missionary, he found to his horror another foreigner dawn upon the scene, whom, at the risk of his head, he was compelled to protect with an escort of probably the very satellites by whom the previous persecution had been organised. I therefore considered that I should be doing all parties a service by remaining a few days until the thorns on which the anti-foreign warrior was sitting had effected sufficient penetration.

An amusing detail of the situation was that the Commandant

imagined me to be a Roman Catholic bishop. An officer whom he had been directed to appoint as my conductor to the Gold River inquired in all simplicity and sincerity how many times a week I celebrated mass. It must not for a moment be supposed that the natives of Western China draw any distinction between one foreign nation and another; so far from that, they are apt to include Japanese and Nipalese, and even Manchus and Mongols, in the same category with Europeans. One very soon discovers that any discrimination of so minute a character is far beyond the range of native intellect. I was therefore obliged to accept the position of a foreigner in general, without distinction of race or religion, nationality, language, or business. The authorities believed that my errand was to verify the publicity of the Margary proclamation, and accordingly it was generally posted in some situation conspicuous to our view whenever we entered a city. I took every occasion to explain that such was only a part, though a very important part, of my duty. "I wished also to see how officials and people were disposed towards foreigners. I hoped that the civility which I had received would not prove exceptional. I had been sent to the province to inquire about its commerce, its routes, its produce, and its geography generally." It is needless to say that nobody believed me; but as I freely showed visitors everything I possessed, and betrayed what seemed to them a frivolous interest in very unimportant matters, they satisfied themselves that on the whole I was more eccentric than dangerous. Little obstruction, therefore, was placed in my way so far as regards mere travelling, and those officials whose consciences pricked them for previous sins against foreigners seized the occasion to afford me a too ostentatious protection.

It must be admitted that the Commandant took the most delicate care of me; and thereby of himself. I traversed all the principal streets three times escorted by his retainers, and every here and there emissaries might be seen among the multitude maintaining not only order but silence. The natives were evidently well inclined towards me, but were afraid to answer questions. On the third day the Commandant invited me to visit the lake, informing me that he had prepared a temple for my reception. A journey of an hour and a half brought us to a handsome building a few hundred yards up the slope of a hill, overlooking from numerous balconies a lovely scene of woods and water. Nowhere had we seen a temple maintained in such complete repair, order, and cleanliness, and, unable to explain the mystery, we went to examine the shrine in which the idols are installed. There we discovered that we were in the *Commandant's own temple*, not that it belonged to or had been built by him, but in the sense that Jupiter's temple is the temple of Jupiter. It had been erected to him by a public grateful for his successful exertions against the horde of Shih Ta-k'ai. Incense was urning before the Commandant's image, a slavish likeness, with half-

closed eyes, goitrous neck, and long finger nails as black as life. It is, therefore, no hyperbole to call him the idol of his people; but it is very doubtful if the provincial authorities would be satisfied with the presumption of so insignificant a personage as a commandant in allowing himself to be promoted to heaven before his time. The rogue had evidently invited me to behold his deification.

The lake is about eight miles long by two and a half broad, bordered by thick groves, and commanded by gently sloping hills from 1500 feet to 2000 feet above it. The groves are for the most part orchards. Russet pears of unusual size, fine pomegranates, peaches, plums, and delicious oranges shaped like pears with a lemon-like rind, may be had for little more than the asking. The lake is reputed bottomless, like most Chinese lakes; nevertheless, the buildings of the drowned city are said to be visible in calm seasons, and from its submerged ruins chairs, tables, and bedsteads float frequently to the surface!

Crossing the low hills south-west of the lake, we soon regain the main valley. Somewhere before this point a sandstone region begins, through which the Anning river runs in a very sandy bed, spreading its waters, now tinged with red, round many an island and shingle-bank. Though replenished by numberless rivulets, its volume is not greatly enlarged, the increased supply being carried away with a proportionally greater velocity. The vale narrows considerably at the village of Huang-lien-p'u, an advantageous post, in which a customs and Likin collectorate is installed. The officer who had been deputed to escort us hurried past this place, leaving a note to warn us against halting there, on account of the insecurity of the neighbourhood. Whether in consequence, or in spite, of his advice we put up in the most available inn, surrounded by a wall 25 feet high, with a narrow approach secured by double gates of thick pine-slabs, and inside these a strong barricade. I was lodged upstairs in a chamber, the floor of which was encumbered with heaps of rounded stones ranging between the size of apples and turnips, the use of which I failed to divine; but inquiry showed that they were laid up in preparation for a Lolo attack. During the evening a customs officer came in and related how, a fortnight previously, a band of from twenty to thirty Lolos had entered the village soon after midnight, armed with sticks and stones, had burst in the gate of the Custom-house, possessed themselves of 700 taels (about 200*l.*), the produce of the local dues, and, not content with this booty, had invited the officers and underlings, some fifteen in all, to strip and hand over their clothes. Packing up clothes and silver, the marauders proceeded to confiscate the copper cooking-pans of the establishment, and then withdrew. Now this village contains some 150 able-bodied males, and I naturally remarked that it was a shameful thing that they could not protect their property against thirty Lolos armed only with sticks and stones. My visitor, not in the least appreciating the

bearing of the criticism, replied, "Certainly it is very shameful, but how can you expect Lolos, mere savages, to have any sense of shame?" What is still more disgraceful, the robbers were subject Lolos, and not the autonomous Black-bones. "Had they been Black-bones," the visitor explained, "they would not only have plundered us, but they would have carried us off into slavery as well." I afterwards asked the innkeeper what the people do on the occasion of an incursion. "Climb on to the housetops and wait till the Lolos are gone," was his answer. "Then, what is the purpose of the stones which are piled in my bedroom?" "Oh, they are not of much use; the Lolos throw stones much straighter and harder than we can, and practise every day."

The vicinity of Huang-lien-p'u is much infested by wolves, and we were recommended not to venture far from the barricade after nightfall. What with wild beasts and wild men, a less harried existence might be preferable to that of the local commissioner of customs. Ma-li-chai is a larger hamlet, where we found comfortable lodging in a temple at the north end, and received a deputation of village syndics, who were curious to know where Manchester goods came from. Foreign shirtings are only used for the coat-sleeves of women; the fabric is considered very weak, but the price, three taels per piece, does not seem excessive. They had heard of steamers, but were not sure if such conveyances were adapted for dry land. When I inquired what local productions they were prepared to sell to foreign merchants, they replied "opium and pickled mushrooms," and being advised that the demand for such staples would not be lively, they said they were sorry for it but had nothing else. After a desultory conversation they presented a basket of choice potatoes, specimens of native agriculture, and took leave.

Eight or nine miles further on, the high road and the river suddenly turn to the south-east at a point where a valley runs down from a clearly discernible gap about ten miles away in the south-west. Tê-ch'ang, a busy and flourishing village, the centre of the wax-insect traffic, lies at the junction of the valleys, and communicates with the city of Yen-yuan, three days' journey by a road which crosses the gap. The route is considered easy; a ferry somewhere near midway passes a large river, said to be five times as broad as the Anning, i.e. about 200 yards, clearly the Yalung. Yen-yuan, we were told, is a very small city, closely surrounded by hills in which a good deal of copper and some silver is worked. The name of the place means "salt-springs," of which there are five or six, furnishing the consumption of the city itself and of Chien-ch'ang generally. Less than half the inhabitants of the Yen-yuan district are Chinese, the remainder being principally Moso tribes. A journey thither would probably be worth making if for no other purpose than to visit these tribes, who seem to differ from, and in some respects to be superior to, the Sifans. The Chinese consider them very respectable, neighbourly people, and tell me that many of them are

more than half the women carry the unsightly appendage, and we met children about ten years old with very promising dewlaps. Western China should be a favourable field for the study of goitre, since the nature of the country and the habits of the different peoples are so various. The floor of the valleys which we have traversed from Ning-yuan is mostly sandstone, but the ridges, on the east at any rate, are limestone, and the brooks have run a long way through that rock. It should be remembered, however, that the Chinese, as a rule, never drink pure water but always boil it and infuse tea or some substitute. The prevalence of goitre does not seem at all to depend upon the absolute elevation of country. The Ning-yuan valley is about 5000 feet above sea, and the affection prevails in the lowest parts. On the road between Tung-ch'uan and Yünnan Fu, it is most common at T'ang-tzŭ, a village 10 miles south of Hsün-tien-chou, through which runs a hot chalybeate stream at 6500 feet above sea. There the natives attribute it to the local drinking water, and say that they have tried the hot spring as a cure, but without success. In the much more elevated valleys round Mount Do-ker-la, a famous resort of pilgrims near the Yünnan and Tibetan frontier, the natives assert that only those are affected who drink water derived from the melting snows, the inhabitants of villages which are watered by sources below the snow-line being safe from the swelling, as likewise are such well-to-do persons as never drink cold water. In the district of Yu-yang in Eastern Ssŭ-ch'uan, a limestone country, goitre is unknown. It is observable that it is not prevalent in the topmost regions of a country, that is to say on mountains or near the "divides" of plateaus, but occurs in valleys or hollows, though whether the situation be a confined ravine or a slightly depressed and open amphitheatre is indifferent. That the air may stagnate in ravines and so affect the respiratory apparatus is an hypothesis which cannot be accepted in Chien-ch'ang, where I have seen people blown prostrate by the wind.

The apparently conflicting opinions and statements of Chinese on this subject would seem reconcilable if it be assumed that the drinking water of goitrous villages has not merely run through limestone, but has run for a considerable distance through that rock before acquiring its noxious quality. My observation also points to this simple solution of a much debated difficulty.

After quitting Chien-ch'ang we found the villages much more populous than in that overrated prefecture. Kung-mu-ying is large, but Mo-so-ying is 600 yards long, and prosperous withal, containing several spacious and handsome temples, among which that of the Kueichou Guild is the most notable. Kueichou traders are drawn to this remote village by the manufacture of a stout paper, called leather-paper, made from the bark of the Kou (?) tree,* and used for packing the wax-eggs.

* I have since learned that the "Kou" tree is a kind of mulberry, and that "leather-paper" should be "*bark*-paper."

On the 3rd and 4th of September we wound through a very narrow and tortuous valley full of the murmur of rivulets which plunge into the Anning from the mountain recesses between slopes thickly clothed with plantations of the wax-tree. At the village of Chin-ch'üan Bridge, a strong torrent runs in from a parallel valley on the east, under a stone arch which is the southern boundary of Chien-ch'ang. Crossing its stream we entered the district of Hui-li-chou.

For all commercial purposes Chien-ch'ang may be regarded as a mere road from Yünnan to Northern Ssŭ-ch'uan. Its exports are unimportant, consisting chiefly of the wax-insect and of copper, which, however, comes mostly from Yen-yuan. Indeed, the greater part of the insect export also comes from Yen-yuan or the Hui-li-chou region.

At Kung-mu-ying, a very large village, we take leave of the Anning river, which, strongly reinforced by the Chin-ch'üan torrent, slackens its pace and runs south-west down a narrow glen to join the Yalung. A temple built on a small plateau a short distance south of the village of T'ien-sha-kuan affords a commanding view of three mountain avenues, the further course of the Anning, the road by which we have come, and the morrow's track—three vistas, each little less than 20 miles long. The temple gate is a favourite rendezvous of the villagers, and our arrival attracted a knot of gossips who, finding me curious about the prevalence of goitre, collected for my inspection a number of old women dewlapped like camels. They attribute the excrescence to the qualities of the Yen-yuan salt. The salt of Tzŭ-liu-ching, by their account, has no such effect. They are well aware that seaweed, certain kinds of which enter largely into Chinese cookery, is a specific for the swelling; but they do not seem to trouble themselves much about it, declaring that it does no constitutional harm. It is no exaggeration to say that in some villages

Mongol, Indian, or what not, and finding them persistently rejected, abruptly asks the beggar what mountain peak he would prefer as a model for his head-gear. Peak after peak is cited and described, but the beggar is inexorable until Mount *Tisi* is mentioned, which is presumed to be the highest mountain in the world, and the most regularly moulded. Tisi is said to be in Ngari. Then comes the question of material. All the looms of the known world are set at work to furnish silk and cloth, all the steppes of Asia are explored for felt. But the beggar, who, by the way, is no earthly mendicant, but a spirit, will have none of them. Nothing will please him but the sward of a pasture for stuff, the foam of a steep river for tinsel, and a green sunlit forest for a jewel on his frontlet. Therefore the tailor, who I have forgotten to remark is also a spirit, enumerates one by one famous rivers, forests, and pastures, and at length suits his customer with I know not what paragons of Himalayan beauty.

Some day, perhaps, when the powers that be allow us to enter Tibet, the sources of the Irawadi may be discovered in the crown of that beggar's hat. There is little hope of discovering anything, whether fable or fact, under present conditions, unless it be from the like of the excellent Abbé Desgodins, who permits me to support the latter part of this note with his authority.

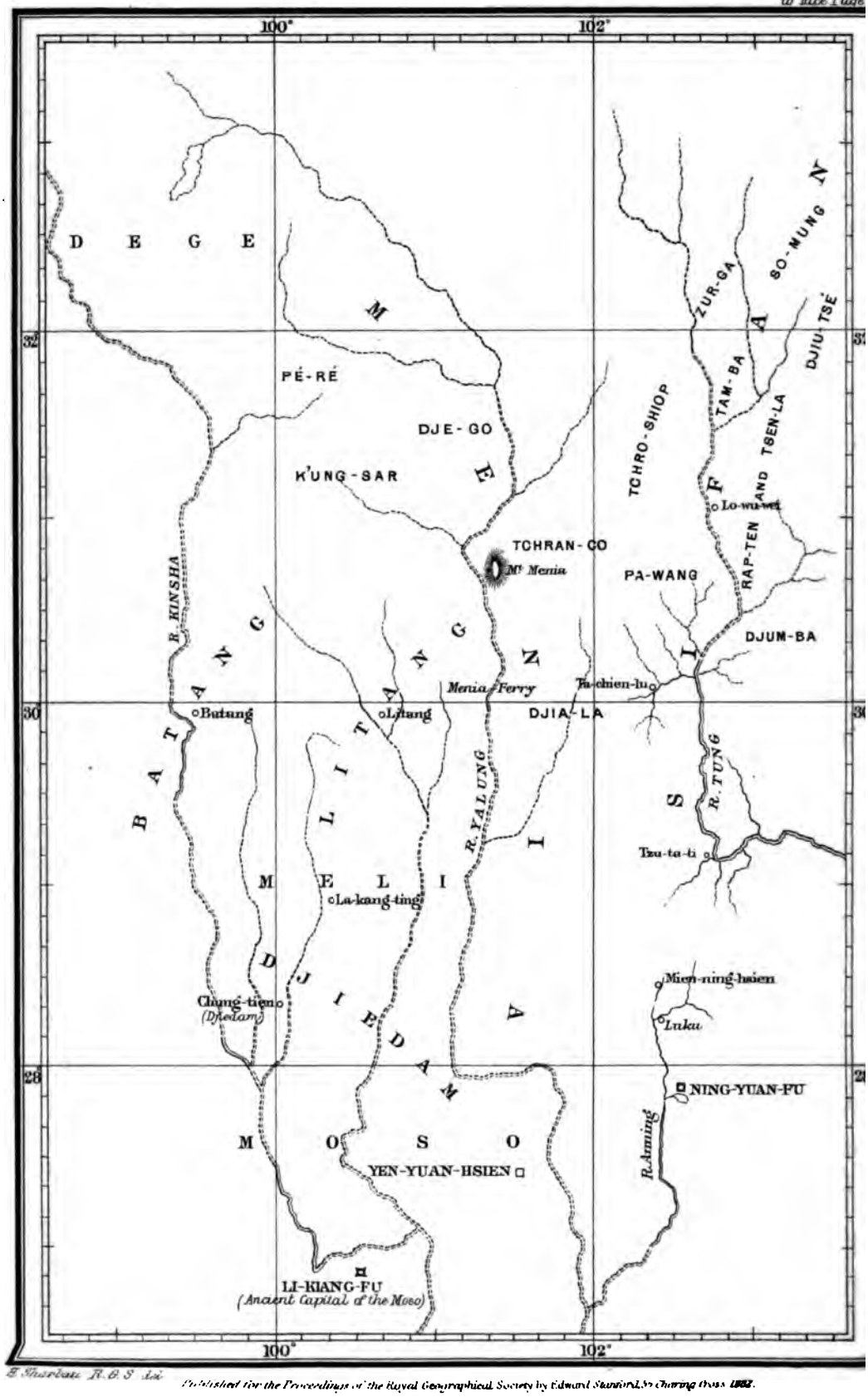
(*Tisé* is the same as *Kailasa*, the Hindu Olympus, lying directly north of Lake Manasarovara. See Captain H. Strachey, in 'Journal R. G. S.,' vol. xxiii. pp. 25 and 48. The sources of the Irawadi will never be found under *that* beggar's hat, I venture to say!—[H. Y.])

We left the flourishing village of Pai-kuo-wan on the 7th, and marched over a low but rough limestone pass to I-mên, a small hamlet lying on the bank of a stream which runs into the Huang-sha valley, and there joins, according to native account, the small river which issues under the Chin-ch'üan bridge. We could see, through a gap, a high steep range, the eastern wall of the Huang-sha valley, which I was told is a long, narrow glen, opening here and there into flats, and partly cultivated; rice does not flourish in it, the streams being reputed too cold for irrigation. Besides copper, it produces coal, a good deal of which was being brought to market in the form of coke. It is ill-famed for wolves and other wild beasts which infest it. While we were breakfasting in I-mên a native came in and reported that on the previous evening a panther had chased a dog into a hut where two women and two children were sitting round the fire. All four were badly torn about the face, and the women were not expected to recover.

Crossing a second low pass, we soon entered a flat-floored rice-grown valley between low level-topped hills, which led us into Hui-li-chou, a large city, with a still larger walled suburb, the houses roughly and poorly built, evidently a centre of trade rather than of residence. The population is perhaps about 30,000. The welfare of the place depends entirely upon the traffic which passes through it, and upon the mines. All neighbouring districts removed from the highway, or unconcerned with the mining industry, are miserably and incredibly poor. Its commerce consists of opium, cotton-cloth, raw cotton, raw copper, worked copper, i. e. copper which has been cast into a semblance of pot or pannikin, so as to evade the government monopoly, zinc, and a variety of articles included under the name of hill goods, such as furs, bones of wild beasts, deer horns, musk, and medicinal herbs and roots. Having alluded to the opium and cotton trade in various reports, I need not here enlarge upon it. Metals are the only local produce, and among these is the famous white copper, an alloy which resembles German silver. It is used by the Chinese in the manufacture of various utensils, chiefly perhaps teapots and waterpipes, and is supposed by them to be an original metal. Analysts have found in different specimens different proportions of copper, nickel, antimony, zinc, lead, iron, tin, arsenic, and silver, but the discrepancy is easily accounted for, since, as Baron von Richthofen has remarked, the original material, produced exclusively near Hui-li-chou, is remelted and alloyed for the trade to suit different tastes or purposes. It has also been erroneously supposed that the composition is the produce of a single unidentified mineral. As I learned from the miners, however, white copper is obtained by the combination of two ores, viz. red copper ore and old copper ore. The red copper ore is copper pyrites, but what the old copper ore may be is not so easily declared. It very much resembles the former, and is of about the same hardness, but a little darker in colour. Its specific gravity is 4·5,

# Map illustrating the distribution of the Sifan Tribes

*to face Page*

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and it strongly affects the needle of a compass. Father Vincot, the accomplished Procureur of the Roman Catholic Mission at Ch'ung-ch'ing, having kindly tested my specimens with the best means at his disposal, calls it nickeliferous sulphuret of iron, but his analysis leaves a residue which he has not succeeded in identifying. The miners told me that a mixture of a small proportion of this ore with copper pyrites yields what is locally known as old copper; a larger proportion gives the alloy called white copper.

Hui-li-chou, according to my result, is 6000 feet above sea-level, an approximation which agrees fairly well with Garnier's calculation of 1900 metres, or 6234 feet.* During our journey down Chien-ch'ang we were favoured with bright weather in the daytime, but soon after sunset the sky generally became obscured. The wind was southerly, and often blew great guns. The thermometer showed at 7 A.M., from the 27th of August to the 5th of September, a mean of 67°, from which it would seem that the climate is three or four degrees warmer than might have been expected.

*Note on the Sifan Tribes.*—Since the national names of the Sifan, cited above, are trustworthy, and several of them are recognisable on the Chinese map, it seems well to make the most of them as a clue to the involved question of the ethnology of the region. Menia, or Miniak, an unobjectionable designation, includes Ta-chien-lu and the last five. For the rest, Nos. 2 to 13, I would suggest that the name Sifan, which has no very depreciatory meaning, and is occasionally used, should be adopted, and should be confined to them. The lost aborigines who sculptured the caves on the Min river and other tributaries of the Yangtzŭ, and who have not yet been satisfactorily identified with any existing people, may conveniently be called Mantzŭ. The Lolo limits are shown on my chart, and the term Miao-tzŭ, not much employed in Ssŭ-ch'uan, may be relegated as a monopoly to the aborigines of Kueichou. Unless some such arrangement of nomenclature be agreed upon in speaking of these various races, the confusion which has already arisen will become inextricable.

Now let us open the Chinese (native) map, and do our best to identify the position of the twelve Sifan tribes.

*Djum-ba* is known to be Mu-p'ing.

*Djia-k'a* means "near the Chinese," but is not discoverable, any more than

*Wo-je*, otherwise *Go-je*.

* *Addendum.* In his introduction, p. 88, to Captain Gill's 'River of Golden Sand,' Colonel Yule gives 5900 feet as the altitude of Hui-li.

(I regret to find that, owing apparently to my having used a wrong figure in converting the metres of Garnier into feet, all the heights in the note which Mr. Baber refers to are erroneous. They should run: Ta-li-fu, 6955 feet; Yunnan-fu, 6397; Tong-chuan, 7152; Hui-li, 6234.—[H. Y.])

*Rap-ten* (which includes *Tsen-la*) will be discussed further on.

*Tam-ba*, meaning "sacred," is obviously T'ang-pa.

*So-mung*, Captain Gill's Su-mu, lies near Sung-pan T'ing according to my informant, and appears on the native map as "So-mo."

*Djiu-tse*, or *Djiu-tzŭ*, appears as *Chiu-tzŭ*, immediately south-east of the preceding.

*Zur-ga* is most likely the Chinese Sung-kang, and Captain Gill's Ru-kan.

*Tchro-shiop* is undoubtedly Ch'o-ssŭ-chia-pu.

*Pa-wang* is *Pa-wang;* and

*Tchra-tin* and

*Ge-shie* defy conjecture.

The annexed sketch-map, which is chiefly a tracing of the native map (with the above names substituted) shows that the tribes in question inhabit the valley of the Chin-ch'uan, "Gold Stream," a waterway which, for some obscure reason, western geographers have conspired to curtail, although it is the upper course of the T'ung, and in lat. 30° is nearly as broad, and apparently as deep, as the Salwen in lat. 25°. Historians have done it more justice than map-makers. A reference to De Mailla will show how the Emperor Kienlung, "seconding the intentions of Heaven," formed the project of exterminating the natives of its wild gorges, and gave the command of his armies to Akuei. How Akuei soon subjugated the "Little Gold-stream" country; with what difficulty he captured *Lo-wu-wei*, the capital of the "Great Gold-stream," and how the King Sonom fled to Karai; how Akuei *sent the Emperor a map of the country*, and how King Sonom gave himself up, was carried to Peking, and after a grand court ceremony was sliced in pieces; after which the emperor repaired in state to congratulate the empress dowager, attributing all the glory of his success to her virtues, and promoted all the mandarins of the empire, both civil and military.

Furthermore, we are told that "the subjugation of the Eleuts, and the spontaneous allegiance of the Turgouts, form remarkable epochs which do the greatest honour to the firmness, wisdom, and power of Kienlung's rule; but the reduction of the Gold-stream tribes crowns the eulogy of a monarch whom, on account of that single expedition, posterity will not fail to elevate above his predecessors." All this pompous cant about the conquest of a few miserable gorges which geographers disdain to recognise.

The conquest seems to have been completed early in 1775, and doubtless made great stir in Tibet. The news reached the court of the Teshu Lama in March of that year, at which period it happened that a certain Warren Hastings, who took some interest in Tibetan ethnology, had sent Mr. George Bogle on a mission to Teshu-lumbu. Mr. Bogle writes:—"The Lama informed me that news was received

at Lhassa of the Chinese having at length, by means of an immense army, subdued *Ribdyen Gyripo*, the rebellious chief who, with a few thousand brave adherents, had defended himself and his hill-bound country against the united power of the Chinese empire."

Mr. Clements Markham, from whose invaluable work on Tibet I extract Bogle's statement, does not explain the meaning of the words "Ribdyen Gyripo," but the clue we now possess leads obviously to its elucidation. The words are equivalent to *Rapten Djiepo* (or Gyalpo), and mean "King of Rapten"; and since *Lo-wu-wei*, indicated on the Chinese map, was the capital, there is no difficulty in roughly placing the country.

The recognition of the above synonyms will be satisfactory enough to persons familiar with the irregularities which occur in the transmutation of Tibetan names into Chinese. The Menia tribes are disguised as follows:—

| | | |
|---|---|---|
| K'ungsar | appears as | Hor-k'ung-sa. |
| Pere | „ | Hor-pe-li. |
| Tchrango | „ | Hor-chang-ku. |
| Djego | „ | Hor-cho-k'o. |
| Maze is unidentifiable. | | |

These are placed in the valley of the Upper Yalung, north-west of Ta-chien-lu and south-east of the rich country of *De-ge*, or *Der-ge*. Tibetans denote them by the general name of *Hoser k'aga*, which means "Five Hoser tribes," and call their country *Hor* or *Horko*. Hor and the Ta-chien-lu district constitute Menia.*

(*Nota.*—It is, however, quite possible that some other insignificant tribes as yet undiscovered should be included.)

Dull and dry as these notes may be, they cannot fail to be suggestive and useful to future explorers, and I need offer no excuse for adducing a proof or two that the Menia region extends eastward of the Yalung. The crossing of that river on the route to Lit'ang is called by Captain Gill, correctly enough, "Nia Chu-ka"; but the full name is "Menia Chu-ka," meaning *Menia Ferry*, i. e. the crossing from Tibet into Menia. Captain Gill has probably taken note of the curious octagonal stone towers which are passed on the way from Ta-chien-lu to the Yalung, and are not encountered further west.† These ancient buildings were described to me as consisting of two stories, the lower of which is in plan an octagonal star, and the upper a square chamber. The octagonal (i. e. eight-pointed) part is solid to a height of some 12 feet, above which very narrow loopholes are pierced in the angles (not

* This word "Hor" must not be inconsiderately confounded with the Hor which denotes the Turk races of Northern Tibet. The latter is pronounced as in the English word "hurry," the former as in "horrid." At the same time it is quite open to theorists to make as much as they fairly can of so seductive a consonance.

† See 'River of Golden Sand,' ii. 236.—[H. Y.]

the points) of the star. Flat slabs laid on the summit of the octagon support the upper chamber, which has no door, windows, or loopholes. What the use of these buildings may have been is unknown, but the presumption is that they were watch towers; for the present purpose it is enough to know that they are universally said to have been erected by the Menia, and that there is nothing resembling them west of the Yalung on the main road.

Again, the Chinese map indicates a peak, or a range, east of the Yalung and north-west of Ta-chien-lu, under the name of "Mount Meniak" (Min-ni-ya-k'o), or the "Menia mountains."

Menia must be carefully distinguished from *Meli*, a country of which almost nothing is known, lying south of Lit'ang and west of the Yalung. I can only learn that the language of its inhabitants is unintelligible to Tibetans. The Chinese call it the "land of the Yellow Lamas." The *Mili* of D'Anville's map is probably its chief monastery; *Lar-kin-tin* of the same geographer is situated, according to the Chinese map, in Meli territory, and is styled "the monastery of *La-kang-ting*." South, again, of Meli lies *Chung-tien*, also a Tibetan country, which D'Anville has indicated under its Tibetan name of Tchia-tam (*Djie-dam*). Chung-tien is in the jurisdiction of Yünnan, and without digressing much further I will only remark that *Li-kiang Fu* is the ancient capital of the *Moso*, who are called *Djiung* by the Tibetans and *Nashi* by themselves, and that still further south we come to the *Min-chia* (a Chinese term) aborigines, who form a very strong minority of the inhabitants of Tali Fu and the surrounding districts. The sketch-map, which cannot be grossly erroneous, shows the position of most of these tribes. The blackened river-reaches indicate the parts which have been visited by Captain Gill or myself.

To return to Menia and to Dege. A native of the latter country informed me that his fatherland is north of Lit'ang between the Yalung and the Kinsha, and is bounded northwards by the Mongols of Koko-nor. He affirmed, perhaps with patriotic exaggeration, that it is the richest and most populous of all Tibetan kingdoms, consisting largely of cultivated land which yields one crop yearly. From the latter statement we may conclude that its mean elevation is 10,000 or 11,000 feet; the lowest valleys of these regions produce two harvests, while high plateaus like Lit'ang grow nothing at all. On being asked if it is more populous than Lit'ang, for instance, my informant replied that since it supports more farmers than shepherds it is of course more populous. Large villages of thirty or forty families lie somewhat closely over the whole of its extent, and it contains many lamaserais of 200 or 300 monks, some indeed of 2000 or 3000. Forests are rare, informant explaining that the land undulates, but does not break into ravines and ridges; consequently, he argues, there can be no forests of any extent. There are no destitute families. No family is so poor as not to own a

horse, and he considers the horses of his country to be the best in the world. Many of the farmers possess 4000 ounces of silver, but a grazier who owns 2000 yaks is considered wealthy. Each family devotes a son to the priesthood, and the monks are consequently very numerous. The king resides in a lamaserai of 300 monks. The natives are affluent, because their country is independent of Lhassa, and distant from any main route.

In Tibetan countries the distinction between lowlands and highlands —ploughland and pasture—is very strongly marked; wheat is as great a luxury in the latter as beef and mutton in the former, and many other antitheses might be cited, the most remarkable of which is that polygamy obtains in valleys, while polyandry prevails in the uplands. In the valley-farms, I am told, the work is light and suitable for women; but the rough life and hard fare of a shepherd on pastures 13,000 feet or more above sea-level is too severe for the sex. This explanation has been given me by a European of great experience and long residence in these countries, whose personal conviction, though adverse to marriage in his own case, is strictly monogamous; nevertheless, he feels compelled to admit that the two systems, working side by side, mutually compensate the evils of each, and that both are reasonable under the circumstances, and probably requisite. The subject raises many curious and by no means frivolous questions, but I cannot help thinking it singular that the conduct of courtship and matrimony should be regulated by the barometrical pressure.

De-ge, however, is chiefly a country of husbandmen (a word not devoid of appropriateness in this connection). Four thousand ounces of silver is a great sum in Eastern Tibet, whereas 2000 yaks would be considered rather a mean drove by the nomad graziers of Lit'ang. My informant's remark that De-ge is well-to-do because it is distant from any great highway, although it seems to contradict the first principles of political economy, is most undoubtedly logical. The imposts levied upon the subjects of Tibetan rulers are of two kinds—a land tax, which is very light, and a forced contribution for the travelling expenses of officials, which is a most burdensome exaction. Officials, Chinese or Tibetan, travel free of expense, the people of the district through which they pass being compelled to furnish pack-animals and drivers, and to supply all the wants of the magnate and his retinue. When it is remembered that the officials travel with long cavalcades of merchandise, and that the population is about the scantiest in Asia, the severity of such a corvée will be understood. But the evil pierces deeper than this. The contribution of toil, or of kind, is commuted for a money payment much above its value, which the *Debas* (a Tibetan name for Tibetan officials) instruct their subordinates to collect. The subordinates increase the demand, with the view of appropriating the surplus, and send out their emissaries, each of whom again makes a further addition to the levy, so that the sum-

total ultimately amounts to four or five times the expenses of the traveller. This is the great hardship of the farmer, and almost the only source of the private revenue enjoyed by native officials. It must not, however, be supposed that all districts apart from highways are free from the exaction. It is collected generally all over any Tibetan country, through any part of which a main road passes. But De-ge, it seems, is too far away to be affected.

Although Degeans are disinclined to accept the statement, it is pretty certain that their nation has lately acknowledged its feudal submission —"tied its head" (*Gota*), is the local expression—to Lhassa. A supposition seems to prevail among Europeans that the region which geographers have included under the general name of Tibet is an integral state, subdivided for administrative purposes into separate provinces. Although the assumption is quite erroneous, some palliation of it may be found in the general use by Tibetans of the term "*peu*," pronounced as in French (not, with due deference to Mr. George Bogle, like the French "*pu*"), which is written "Bod," and is doubtless the origin of the final syllable of our word "Tibet." A Tibetan arriving in Ta-chien-lu from Lhassa, on being asked from what country he has come, will often reply, "From *Teu Peu*," meaning from "High" or "Upper Tibet." Perhaps "Teu Peu" is the source of our Tibet, and if so it is equally correct to write "Tibet" or "Thibet," since the word Teu is pronounced indifferently with or without an aspirate. A native employs the expression "*Peu Lombo*" ("Tibet country") to designate *en bloc* all the Tibetan-speaking nationalities, without intending to convey the least insinuation that they are subject to Lhassa. The state of which that city is the capital is called "*Lha-sa De*" ("territory of Lhassa"), or "*Deba Jung*" ("land of the Debas," but the etymology of "Jung" is said to be uncertain), and is merely one, although admittedly the most prominent, of a large number of states governed by kings very little disposed to imagine themselves subordinate to the king, or regent, of Lhassa. King Alfonso of Spain may recognise the dignity, and venerate the sanctity, of the Dalai Lama of Rome, but it by no means follows that he acknowledges himself a tributary of Humbert the First. Nevertheless, it is curious to find that the Government of Lhassa levies war, with the direct and avowed purpose of conquest, upon other states without any material opposition, and indeed almost without any notice, on the part of the Chinese Government. An illustration of this condition of internal relations may be found in the story of *Pun-ro-pa*, which was recounted to me as follows:—

In the year 1863 a war broke out between some of the Menia tribes and De-ge, excited, it is said, by the lamas of the latter kingdom. After a vain appeal for assistance to the Chinese Government, the king of Dege "tied his head" to Lhassa-de, whereupon the regent of that country despatched an army to his aid under Pun-ro-pa, a military officer of the

third rank, who succeeded, after some reverses, in routing the Menia and annexing their territory, including even a part of Djia-la, to Lhassa-de. The conquest was consummated in 1866, and Pun-ro-pa was appointed viceroy—a new title for the occasion—of the newly-acquired dominion. He held sole command during the ten following years, living with barbaric state on the steppes in a magnificent tent, on wheels, hung with the skins of Indian tigers, and drawn by the finest horses, or, on grand occasions, by stags. A numerous band of retainers bearing jewelled arms and clothed in rich uniforms trimmed with otter-skins, attended him on his progresses; but a good deal of his time was spent in a residence which he built at Lit'ang.

The villages in the valleys—there are, of course, no villages on the pasture-lands—having been destroyed during the war, Pun-ro-pa set about rebuilding them, and made some attempt to re-establish an administration; but as soon as a certain order was restored, he began to enrich himself at the expense of the submissive public, and speedily caused a revolt. The outbreak was repressed, but he did not succeed in preventing the complaints of the overtaxed Menia from reaching the ears of the regent and ministers of Lhassa-de. Peremptory orders were sent him to relax the excessive impost—a land-tax—which he had instituted, and he was compelled to devise other methods of feathering his nest. The original invention by which he attained his purpose is another proof that a conqueror is not always a judicious administrator. His scheme was based upon an ingenious system of court-fees and convict-labour. All causes were in the first instance submitted to him, but before the pleadings could be heard both litigants were obliged to wash gold for one year in the sands of the Lit'ang river, the proceeds being paid into court, i. e., into the pocket of Pun-ro-pa. Judgments were, as a rule, summary, and the unjustified were returned to the diggings to work out a second term of gold-washing for the benefit of the Bench.

Pun-ro-pa thus became the most prominent personage of his day, and if he could have withdrawn his family from Lhassa no one doubts that he would have declared himself independent. He now entered upon a new career as a diplomatist, having been instructed by his Government to intrigue for the annexation of Lit'ang and Bat'ang. The recovery of the rich pasture steppes of the former state has always been a purpose of the Lhassa regents. During his frequent visits to Lit'ang, Pun-ro-pa had become intimate with the Chief Deba and his brother-in-law the Second Deba; the desirable friendship of the distinguished and opulent viceroy was eagerly sought and freely accorded, and one day Pun-ro-pa's young daughter was brought down from Lhassa in a splendid wheel-tent and married to the Chief Deba. The wedding preliminaries included a contract by which the Debas "tied their heads" to Lhassa, without, however, promising to aid openly in the annexation of their territory.

When the French missionaries were expelled from Bonga, Pun-ro-pa

was deputed to investigate the outrage. The cause of Christianity, as may be imagined, did not derive any very great advantage from his action, but he took the opportunity to gain over the Debas of Bat'ang to the side of Lhassa with the argument: "Lit'ang is already ours, and will soon declare itself; if you do not speedily consent, you will be enclosed in Lhassa-de by the annexation of Lit'ang, and it may then be too late." It is known that the Debas assented and signed a convention of the desired purport, but both of them perished in the earthquakes of 1870, and the natives opine that the document was destroyed in a fire which broke out after one of those memorable shocks.

It will naturally be asked, what steps were the Chinese officials resident in these countries taking to repress such intrigues and invasions? It must be replied that the *Chantui* (Menia) tribes, against whom the acquisitiveness of Lhassa was more overtly directed, have never completely submitted to China. Moreover, at the period of Pun-ro-pa's career of conquest, Ssŭ-ch'uan was administered by the Governor-General Lo Ping-ch'ang, whose policy was averse to the expensive maintenance of the imperial establishment in Tibetan countries, yielding no advantage to China, already embarrassed and impoverished by the Taiping rebellion. Nor is it the general policy of Chinese officials to interfere in Tibetan disorders. "These are the quarrels of dogs; why should we shed Chinese blood in favour of this or the other brute?" is their ordinary phrase.

The Chinese Commissary of Lit'ang did, however, take alarm at the situation, and by way of making the Debas declare themselves, ordered them to shave their heads and wear the Chinese dress; but he only succeeded in persuading them to do homage on New-year's day in Chinese dress, but without the Chinese coiffure.

The schemes and seductions of Pun-ro-pa were ultimately defeated by the jealously which his success and his pretention had excited at Lhassa. The four Ka-lun (Ministers) of the regent grew alarmed at the progress of his power, and succeeded in causing him to be recalled. For several years he managed to evade the order, until, in 1877, satisfied that he could now aspire to the position of a Ka-lun, or to some new authority which, like his title of viceroy, might be specially created for him, he deigned to return. His eminent services gained him great consideration at first, but his ambition made him so unbearable that he died suddenly in December 1877, in Lhassa. His son died suddenly in the same month and in the same city; and in the same month his daughter, the wife of the Deba, died at Lit'ang. His remaining blood-relations disappeared about the same time, and the family is now extinct.

The moral of Pun-ro-pa's ambition and fall is sufficiently evident, and the King of Djia-la, a confirmed enemy of Lhassa-de, has saved me the trouble of pointing it. A missionary happened to be present when

the news of Pun-ro-pa's death was brought to the king. His Majesty remarked, with a tone of regret, "I wonder what has become of all that gold."

Mr. T. T. Cooper, who passed through Lit'ang in 1868, the year in which Pun-ro-pa went to Bat'ang, does not make mention of the famous Tibetan general; but his account of the Chantui—a name which he writes Zandi—evidently alludes to the war which had just terminated. Soon after crossing the Yalung he hears of "the dreaded Zandi tribe, inhabiting the mountains forty miles to the south-west of this district. Only the year before a party from this tribe had destroyed the house of my host, and carried off into slavery many of his relations. These Zandi tribes, for there is another tribe in the country to the north, are the only Tibetans absolutely independent of the Chinese government. Under the rule of hereditary chiefs they cultivate the mountain glens with bearded wheat and white peas; but they are also bandits on a large scale. Every now and then they issue from their fastnesses, well mounted on hardy and swift ponies, and sweeping through the well inhabited valleys of the more peaceable Tibetans, surprise and burn the villages, and carry off crowds of captives and herds of cattle and sheep to their mountains. The northern tribe is the most powerful; but their present chief is allied by marriage to the old Tibetan king at Ta-chien-lu, and on friendly terms with the Chinese and Tibetan governments; abstaining from predatory excursions, but maintaining absolute independence like the southern tribe. They are very warlike, and appear to be divided into several clans, constantly engaged in deadly feuds with each other, but uniting in one common cause against attacks from without. They also are cultivators, and rich in slaves, herds, and flocks. Both tribes acknowledge the spiritual power of the Grand Lama at Lhassa, and maintain Lama priests."

The "northern tribe" here mentioned is unquestionably De-ge; the king of that state married the sister of the king of Ta-chien-lu. According to Mr. Cooper's information, therefore, De-ge is a Chantui nation.

Speaking of the town of Lit'ang, the same traveller writes: "One thing struck me very forcibly, and that was the peculiar physique of the people, differing from that common amongst the people of Tibet, who are very tall and large framed, having dark complexions, and a profusion of black hair hanging over their shoulders; many of the Lit'angites, on the contrary, were thick, sturdy fellows, with short woolly hair, and light complexion. I tried in vain to obtain any explanation of these racial peculiarities; though it was said that some of these people had come from countries to the south of Lhassa."

It is pleasant to be able to explain Mr. Cooper's difficulty. I ascertained that the "thick, sturdy fellows, with short woolly hair and light complexion," belonged to Pun-ro-pa's body guard, and were natives

of Lhassa-de, or of some neighbouring country, and not of Lit'ang. The difference in shape and feature between the Western Tibetans and those of Kham (Eastern or Lower Tibet) is very marked; but the complexion of these highlanders is a mere question of sun and wind, and dirt.

*Addendum.*—It will have been perceived by those sagacious persons who deny the value of intuition, that the argument by which I have attempted to connect Marco Polo's Ciandu with the Chantui ought to have elucidated the ethnology of the Tzŭ-ta-ti people, and should at least have shown that the so-called Sifan of Chien-ch'ang lay claim to a Menia nationality. The world contains only one geographer to whom I could have appealed against such baseless and morose objections, and fortunately he has given judgment, even before the appeal could be lodged, in his "Introductory Essay" to Captain Gill's 'River of Golden Sand,' which I have just received. He reproduces a note from Mr. Bryan Hodgson, which speaks of a mendicant friar from *Manyak, a native of Ka'kho, six days south of Ta-chien-lu.* Now *Lo-ku* is six days south of Ta-chien-lu, *viâ* Tzŭ-ta-ti and Mien-ning, and is very likely the same name; but however that may be, it is quite clear that Mr. Hodgson's *Manyak* was a native of the Chien-ch'ang valley. That *Manyak* is the same as *Menia(k)* is not worth the trouble of writing.

To hint the nationality of the people of Tzŭ-ta-ti, I have only to write down their numerals, with the numerative affix *bu*, and over against them to place the numerals of Mr. Hodgson's Manyak. But I protest against *Skwibi; Skwibi* is impossible.

| | |
|---|---|
| 1. Tụ-bu .. .. .. .. | Ta-bi. |
| 2. Nụ-bu .. .. .. .. | Na-bi. |
| 3. Si-bu .. .. .. .. | Si-bi. |
| 4. Jro-bu .. .. .. .. | Rê-bi. |
| 5. Ngei-bu.. .. .. .. | Nga-bi. |
| 6. Tch'u-bu .. .. .. | Tru-bi. |
| 7. Shun-bu .. .. .. | Skwi-bi. |
| 8. Jih-bu .. .. .. .. | Zi-bi. |
| 9. Ngo-bu .. .. .. .. | Gu-bi. |
| 10. Tch'i-tch'i-bu .. .. | Chê-chi-bi. |

The rather long shot registered on p. 83 of the "Introductory Essay"—("the Manyak are probably the Sifan south of Ta-chien-lu")—is, therefore, another hit to be appended to the score of a famous marksman.

Captain Gill has an allusion to Pun-ro-pa, on p. 198, vol. ii. (but spells him with a *k*—Peun-kop-pa—"farewell renown!"), and it is interesting to find it mentioned, on p. 222, "that everything good came from a place called *Turkai*, or some such name, lying to the north of Lit'ang and Bat'ang, and eleven days' journey from both. The chief's best horses came from there, so did his saddles; all the jewellery, except the

Lhassa work, is said to be made in that town, and no swords or guns of any value are turned out from any other manufactory. Altogether it ought to be an interesting place, and well worthy of a visit."

Now *Tur-kai* is the Chinese form of *Der-ge* or *De-ge*.

### 5. The Banks of the Gold River.

Frequent rains confined us for four days to the Examination Hall of Hui-li-chou, after which, in spite of a still unpromising sky, we turned eastwards and followed for three days part of Mr. Garnier's route, which has been described by Mr. de Carné in the *Revue des Deux Mondes*. It is a strange district, well deserving the attention of a geographer: a barren series of low sandstone ranges curiously devoid of vegetation, about half the surface being thinly grown over, and the remainder, chiefly the upper slopes, consisting of nearly bare rock of a reddish or a brown-red hue. These downs are in fact almost a desert, with a very scant shrubbery of fir-groves. But the heavy rains and wild winds which denude the more exposed slopes fill the glens with a productive soil, and many narrow hollows are carefully cultivated. The grain known as "red" rice grows luxuriantly in these damp, not to say flooded, crevices, and on their edges maize and tobacco are planted, and the broad sunflower bows to the east from a stalk seven feet high. Chili-pods, almost the sole export, attain great size in such favoured nooks, and potatoes abound.

In many places there is no road. The streams are numerous, broad, and violent, but ferries are rare and bridges unknown. We had to make the best of our way through the fords, happy when the water was below our waists; when deeper than that measurement the rapid streams were unfordable and a long détour became necessary. The natives are ragged and ill-fed. Near K'u-chu I saw a girl of ten or eleven years of age, whose only clothing was the embroidered shoes which cramped her club-feet. A more extravagant instance of the influence of fashion could hardly be cited. One day our coolies had a journey until noon on empty stomachs, being unwilling to submit to the demand of four cash for a boiled ear of maize. The sparse hamlets do not afford sufficient accommodation for carriers, who have often to rough it in mat sheds or under the eaves of a hovel, in view of which prospect they provide themselves with Lolo cloaks. Yet this track is a Chinese trade-route, the highway from Hui-li-chou to T'ung-ch'uan.

The wealthiest proprietor in the district is a young gentleman of low stature, nineteen years of age, named Lung, whom we met in K'u-chu. His land is let to thirty farmers, who pay him in the aggregate thirty-six *tan* of rice annually. One *tan* is three hundred Chinese pounds, and the odd six *tan* suffice for the wants of his family. The

remaining thirty *tan* are worth about 30*l.*, of which he has to pay 8*l.* in dues, whereby it may be seen that his income is 22*l.*

Determined at all hazards to take the shortest cut out of such a country, we deserted the main route at K'u-chu and struck north-east into the mountains, ascending a slope which rose gradually but continuously until, after a four hours' walk, we attained a ridge nearly nine thousand feet above sea-level. The hill-tops are here much less bare than the region we had abandoned, and even near the summits a few patches of buckwheat may be seen, far distant from any habitation. We did not pass a single native, much less a cottage, in six hours' journeying. There is no road, but only devious paths, which of course lead the villagers to their fields and pastures and do not follow the easiest gradients or the most direct routes. Overtaken by rain, we were very glad to reach, towards dark, the hamlet of Tu-ké, lying in a hollow, of which about two square miles are cultivated, partly with indigo. Some forty mud hovels compose the hamlet; peeping through the doorways, we could see the family circles seated on the mud-floor round brushwood fires, and dining off potatoes and maize. The young people up to the age of fourteen are clothed in a single garment of sack-cloth, even the Lolo felt being beyond their means. From this point, to the banks of the Gold River, we were greatly perplexed by a currency question. Soon after leaving Hui-li-chou we found small and debased cash in use, fourteen hundred of which the traveller may obtain for a thousand ordinary cash; but when he finds it necessary after a journey of two days to get rid of the local coinage on leaving the district in which it circulates, he is obliged to pay *fifteen* hundred debased cash for a thousand current coins of the realm. This exchange difficulty enters into every transaction, no matter how insignificant; maize-ears, oil, and rice are all haggled over, and always to the detriment of the stranger. Such a condition, though exasperating, is more or less explicable; but at Tu-ké the circulating medium has fallen to a depth of degradation which almost outvies comparison. There the local cash exchange for silver at the rate of forty thousand per Chinese ounce—in other words, one hundred and fifty of them are equivalent to one British farthing. They are mere rings, rather more than a third of an inch in diameter, without any pretence of a superscription. Even the natives do not generally count them, but rather measure out certain lengths of them on a board. But a further complication arises from the natives refusing to accept payment from strangers in these coins for local produce; the seller demands ordinary coins, and possesses erroneous but invincible opinions about the rate of exchange. Owing to the lack of comestibles, and the abundance of coins, it took us longer in that country to pay for our dinner than to eat it.

The best lodging we can find in Tu-ké is a small ruined temple of one chamber, without deities, doors, or windows. We soon light a

blazing fire of brushwood round which every one huddles in hopes at least to dry his steaming clothes; for the piercing wind and rain, finding easy entrance, allow little prospect of getting seriously warm. A meal of potatoes and maize is not exhilarating, and the blinding smoke and flickering rush-lamp do not conduce to accuracy of mapping or freedom of thought in posting up a journal. In the morning everybody is ill-tempered and mutinous, but a factitious bond of union exists in the general anxiety to get away from such inhospitable quarters, in spite of the continuous rain. In consequence of such troubles, we only made some seven miles on the 15th, glad to find more comfortable lodging in the residence of a T'u-ssŭ, or hereditary chief of subject Lolos, Lu by name. The place is called Ché-po and is nominally a village, but does not contain more than a dozen huts. Lu's residence, however, has evidently been a handsome and extensive establishment; its white walls still show imposingly in the distance; but after passing the court-yard, which retains some remnants of former elegance in a series of stone panels carved with animals and foliage, we found little but ruin inside. The chief is a tall, good-looking young man, twenty-three years of age, a Lolo *pur sang*, but being under Chinese jurisdiction his dress and bearing are Chinese. His manners would be pleasing were it not for the clammy lacquer of Chinese etiquette which his position as a blue-buttoned official has plastered over him. One detects the Lolo, however, even under such disguise; the Chinese skull-cap sits uneasily on his crown, and droops forward with a sidewise cant in the manner of the Blackbone's horn. Occasionally, too, he speaks more directly and boldly than a Chinaman would venture to do. I caught a glimpse of his wife, a graceful, clear-faced girl, as she was engaged in catching a glimpse of me, and remarked her Lolo petticoats and bare feet. Lu's situation, between the Chinese and Lolo fires, is anything but comfortable; the Chinese officials treat him as a savage, while the Lolos regard him as a renegade; his succession to the blue button of chieftainship—or, more truly, of subjection—was only secured by heavy payments to the local Chinese authorities, who were thereby induced to petition the Governor-general for his recognition. He receives no salary. His establishment, his court of justice, his soldiers, officers, escort, and underlings, a hundred persons in all, are maintained at his cost. Although he owns a very wide property both in Lolodom and in the country we have been traversing, agriculture affords so small a return that he expressed his intention of embarking in the wax-insect traffic, or preferably, if he can form a connection, in the import of Yünnan opium. His residence at Ché-po was demolished by Shih-ta-k'ai's army; the total loss which his family suffered by that invasion he estimates at 7000*l.*, since besides the destruction of house-property he was plundered of a collection of valuable objects which had been amassed by an immemorial line of ancestral chieftains. He possesses,

however, other mansions besides that of Ché-po, and in far better preservation. The village of K'u-chu,* otherwise Tsan-yü-pa, is built upon his property. All the mountains and vales between the stream which passes that village and the Gold River have been the domain of his family since the beginning of time, a period which, I displeased him by observing, must have been a good many years ago. His retainers and servants are all hereditary. His people submitted to the Chinese domination during the reign of Kien-lung. Should he have no children the succession is still secure, for he has several hundreds of relations, any one of whom, even among the females, is eligible for the chieftainship. On the Chinese map his territory is written "*Cho-pao*," a corruption of the name of this village.

The plague of his peace has been the Huo-erh-liu (apparently not a Chinese term), a banditti, composed mostly of Chinese outlaws, which infest the border all round Lolodom. The outrages which are attributed to the Blackbones—always excepting the slave hunts—are in general committed by these freebooters. A deep valley called Mu-ti-lung, bounded by a high black-looking range of the same name, which was visible to the northwards during the last two days' journey, had until a few months before my visit been the headquarters of one of such robber-chiefs, Chang San Piao-tzŭ ("Chang, the third spearman") by name, whose habit was to waylay Lolos and to exact a ransom by compressing their heads in an iron ring. Unable to obtain redress from Lu, who is powerless against Chinese, the Lolos assembled, surrounded the village of Mu-ti-lung (otherwise Hsin-kai-tzŭ), secured Chang, conducted him to the bank of a river, and there decapitated him. This act of wild but condign justice has been represented to the Chinese authorities as another Lolo atrocity, and Lu is held responsible for it. During the sway of Chang, Lu had to maintain a force of nearly a thousand men for his own protection, at great expense, and he is now in process of disbursing what is likely to prove a still more formidable sum in presents, which he hopes will secure him against an accusation of murder.

With regard to myself, Lu had received instructions from his Chinese superiors to the effect that "they had not been informed of the purpose of my journey, and that the deputies who had been appointed to escort me from place to place had each and all uniformly failed to discover it. Nevertheless it would be well for him not to cause trouble." Such a system of suspicion and antipathy is pre-eminently Chinese. Incapable of speaking the truth, they are equally incapable of believing it. It was

* Such names as K'u-chu, Tu-ké, Ché-po, Wa-wu, Mu-ti-lung, are Lolo. These several places also possess Chinese names which are little used, although but few Lolos are now found in the country. Lolos, however, still inhabit parts of the district round Ta-ch'iao (*vide* Garnier's chart); a place which, by the way, is called *Old Hui-li-chou* on the Chinese map, and is mistaken for the modern Hui-li-chou on most European maps.

vain to repeat on all occasions the assurance that I had come to see what facilities the country offered for trade, or to exhibit a safe-conduct from the Tsungli Yamên containing the same simple declaration. "Chercher midi à quatorze heures" is a pursuit in which Chinese officialdom has attained high proficiency. In the lower part of Chien-ch'ang the authorities had given out that I was a member of the Imperial Manchu family, sent on a private mission to inspect the border!

Leaving Ché-po we crossed a ridge, descended into a valley, forded a large stream, and then mounted a high range, from the summit of which we descried the line of mountains which form the right bank of the Yangtzŭ. It is not likely that Marco Polo came this way from Hui-li-chou; he probably continued his route southward from that city into Yünnan. But why does he call the Upper Yangtzŭ by the name of *Gold River* instead of *Golden Sand River* (Chin-sha-chiang)?* To any one who feels confidence in the accuracy of the Venetian's narrative the answer to such a question should appear direct and decided—Marco simply wrote down the correct name as it was given him by the natives. And there is in fact no mystery whatever in the matter; the river is never called locally by any other name than *Chin-ho*, or "Gold River." The term *Chin-sha-chiang* should in strictness be confined to the Tibetan course of the stream; as applied to other parts it is a mere book name. There is no great objection to its adoption, except that it is unintelligible to the inhabitants of the banks, and is liable to mislead travellers in search of indigenous information, but at any rate it should not be supposed to asperse Marco Polo's accuracy. *Gold River* is the local name from the junction of the Yalung to about P'ing-shan; below P'ing-shan it is known by various designations, but the Ssŭ-ch'uanese naturally call it "the River," or, by contrast with its affluents, the "Big River" (Ta-ho).†

As we came down the slope we began to notice, at the height of about 4000 feet above the river, that the path had cut deep into the mountain-side and that we were passing between vertical walls of a deposit which might easily be mistaken at first sight for a very soft sandstone. Further on, when the view began to open out as the lower spurs were approached, it became evident that most of the slope was covered with this substance, and to no slight depth judging from the

* Mr. Baber's memory has misled him here. Marco Polo nowhere calls the river "Gold River." The name he gives it is *Brius*, which appears to be a corruption of one of the Tibetan names. He says indeed: "In this river is found much gold-dust," Bk. ii. ch. xlvi.—[H. Y.]

† Between Sha-shih and the confluence of the Tung-ting Lake the Yangtzŭ is sometimes called *Ching-ho*, a name which Captain Blakiston very pardonably confounded with *Chin-ho*. That term, however, means "Thorn River," and is obviously taken from the ancient name (Ching) of the country which the river drains, much as the word *Yangtzŭ* is traced to the kingdom of Yang. The cities of Ching-chou and Yang-chou have retained the names of the primitive states.

fissures which seamed it. Thrusting a knife into the face of one of the walls at about twenty feet below the general surface, we extracted a snail shell and a small calcareous concretion. Still lower down, where the road ran nearly level for a few hundred yards, we passed along the brink of a crevasse with truly vertical sides and sharp edges, about 60 feet deep by 12 broad, having a stream at the bottom and other crevasses branching from it. The colour of the deposit is a brown-yellow, with a reddish tendency; its substance, though not very easy to dig into *in situ* with a knife, crumbles into fine particles and does not differ in appearance from loam. While I was looking into the crevasse my servant, who had travelled with Baron v. Richthofen, came up and said—"This is the kind of earth in which the people of Shansi dig caves to live in; but in that province the precipices are so deep that it makes one giddy to look down." There can be hardly any doubt that he was right, and that this layer of dense and almost rock-like loam is the same as the *Loess* of Northern China.

The discovery in so unexpected a quarter of a patch of vertically cleaving loam cannot fail to interest geologists. It extends from near the Yangtzŭ bank to about 4000 feet, perhaps a good deal more, up the mountain-side. How deep it may be it is impossible to say from so cursory a view, but perhaps 50 feet would not be too high an average. On the right bank at Ch'iao-chia-T'ing, the place where we crossed, the deposit is hardly perceptible, but a mile or two further south the narrow strip of exceedingly fertile land on the river bank, known as Mi-liang-pa, is said to be covered with it. I cannot affirm that it existed westward of the mountain-ridge on the left bank, but I have an *ex-post-facto* idea that thin patches occur between Ché-po and Ta-t'an-kuan-yao. The thickest layer we came across is about two miles up the hill-side above Wa-wu, the village where we struck the river.

With so superficial a knowledge of the subject, and of the locality, it may be presumptuous to possess an opinion respecting the mode in which this soil has been formed; still there is no harm in hinting a suggestion, though it may seem a fanciful one. The idea that the deposit may have been submarine is hardly conceivable. If it had been formed by the steady secretive waters of a lake—as it is very probable that this part of the river was at one time a long lake before it had drained down to its present level by the opening or erosion of the gorges further on—then we should have expected the layer to show a more or less horizontal surface; a condition which it does not in the least fulfil, but merely coats the undulations of hill spurs. Moreover other lakes in the neighbourhood should have amassed a similar sediment, which they have not done. The plain of Tung-ch'uan for instance, evidently a lacustrine flat and indeed still a lake in part, is a peat-bog from which peat is dug for fuel. Under the lake theory one would look for loess, but without finding it, in every hollow above a Yangtzŭ gorge.

Whence then has this exorbitantly thick soil been derived? Is there any contiguous region which is exceptionally soilless? Most certainly there is; for the face of the plateau between Hui-li and K'u-chu, as we have seen, is strangely naked, containing wide expanses of almost bare sandstone. But does any cause exist to convey soil from that district to the slopes of the Yangtzŭ depression? It seems sufficient to reply that the winds of winter and spring blow from the south-west and west, precisely in the requisite direction. But why should such winds fail to carry the particles beyond the banks of the Yangtzŭ? The traveller who descends from Ta-t'an-kuan-yao to Wa-wu will see the obstacle staring him in the face, in the form of a very steep mountain ridge 8000 feet above the river and about 10,000 above the sea.*

A few miles below Wa-wu is a village named P'ei-sha which is indicated on European maps. Probably the Jesuit surveyors paid it a visit; but it seems certain that they drew the course of the river from that point to P'ing-shan Hsien by mere guess-work, and very erroneously.

We crossed the Yangtzŭ, quitting Ssŭ-ch'uan and entering Yünnan on the 18th of September. The river is here 490 feet broad at the narrowest part, and evidently of great depth, running between sandy banks with a speed estimated at six or seven knots in mid-channel. There were no shoals or sandbanks to obstruct its course, and navigation from Meng-ku, 30 or 40 miles higher up, is said to be safe and easy, though very little advantage is taken of it. We saw no vessel except the small and crazy punt in which we crossed. Half a day's journey north, we were told, all boat passage is barred by a succession of cataracts† far more dangerous than any similar obstruction on the Lower Yangtzŭ.

It was our intention to follow a track which keeps along the right bank; but we were told that it was next to impracticable at all seasons, and was now submerged. There was nothing for it therefore but to climb again into the mountains. A mile or more up the slope we entered Ch'iao-chia T'ing, a small, loosely built, and impoverished town, purporting to be celebrated throughout China for its pomegranates, which are grown on the fertile tract called Mi-liang-pa, beneath and south of the town. Here we had to make new acquaintances and obtain,

* The theory of the sub-aërial deposit of *loess*, which Mr. Baber here briefly illustrates, has been worked out by its originator, Baron F. v. Richthofen, with extraordinary elaboration and skill, in his great work 'China,' vol. i.—[H. Y.]

† From Wa-wu to Huang-kuo-shu the river falls, roughly, about six feet per mile; from Huang-kuo-shu to P'ing-shan, about three feet; from P'ing-shan to Chung-ching, more approximately, nineteen inches, and in its lower course less than six inches. From Bat'ang, on the Tibetan border, to Wa-wu its fall is not less than eight feet per mile.

For the difference between the river levels at P'ing-shan and Chung-ching I have computed three results (A) from the barometrical record in Captain Blakiston's book, and three others (B) from a similar record kept by myself when attached to Mr. Grosvenor's

if possible, a fresh conductor. The magistrate of the place, a native of Hankow, was much interested to hear that the foreign settlement is flourishing. The military official is a relative of the Prefect of Tientsin who was punished for complicity in the massacre of 1870. Notwithstanding such advantages, they exhibited the usual dense Chinese ignorance; the military gentleman, for instance, being anxious to know whether the *Duke* of England is also the ruler of France. They informed me that a Lolo foray was expected, and that I had better take the high road, by Tung-ch'uan and Chao-tung; but this I declined to do, wishing to see more of the Gold River. For their objection that there was no road through the mountains I was prepared, having with the assistance of a peddler compiled a list of stages. The officials examined this document with close attention, and after consultation declared that no such line of route existed; which is not surprising, for I afterwards discovered that most of the places were imaginary. They promised, however, to furnish a guide who would conduct us to the bank of the Niu-lan river, but on starting next morning no such functionary put in appearance.

As seen from Ch'iao-chia the ascent looks short and gradual, but having surveyed it leisurely from the heights on the other bank we knew that a whole day's climb was to be expected; and in effect the steep zigzag required eight hours to surmount, including frequent rests. After having ascended a little more than 7000 feet we stood on the top of the pass, expecting to see the plateau of Northern Yünnan stretching before us. No such easy fortune awaited us; the highest point of the pass is a small flat ending abruptly on the east in a precipice some 25 degrees out of the perpendicular, and 1500 feet deep, which again terminates in an undercut limestone bluff, the wall of an encased torrent running in a contrary direction to that of the Yangtzŭ. The further side of this chasm is a broken plateau, partly cultivated,

mission. The three determinations in both cases are derived from the several morning, midday, and evening pressures. (C) and (D) are obtained from a comparison of the *data* in those two records with the mean pressure at Chung-ching for the corresponding periods, registered by myself during the last three years, and duly corrected.

| A. | B. | Means. |
|---|---|---|
| 427 feet. | 363 feet. | 395 feet. |
| 402 „ | 384 „ | 393 „ |
| 415 „ | 373 „ | 394 „ |
| C. | D. | |
| 378 „ | 354 „ | 366 „ |
| 416 „ | 354 „ | 385 „ |
| 437 „ | 318 „ | 377 „ |
| | | 385 „ |

For the level of the Yangtzŭ at Chung-ching I have obtained 630 feet, a determination which cannot be very wide of the truth, as it is the *résumé* of some four thousand readings for pressure (with Kew corrections) and temperature.

but a few miles southward the surface splits into a wild region of bare crags and gullies.

Our company lodged for the night in a hut the door of which was the only adit for light and exit for the smoke of a fire of dwarf bamboos. The place—or rather a walled hamlet on a promontory close at hand—is called Ai-chuo ("precipice-foot") and is appropriately named. The narrow path, a mere step from one precipice to another, is imminently perilous. At one point called T'an-pêng-tzŭ ("charcoal-shed") it crosses a kind of shoot down which stones and masses of earth descend with very impressive velocity, dislodged from the heights above by wind, or rain, or browsing goats. We saw nothing more formidable than fragments the size of paving-stones come down crashing along with leaps of 100 feet into the gulf below. At this spot the path, which for 50 yards is a foot-wide track rammed with the back of a hoe in the loose slope of earth launched from above, is of course in continuous process of being carried away. There is probably no danger for an unencumbered passenger who can run lightly across, and moreover the approach of the cannonading stones can be heard several seconds before they reach the track; nevertheless our heavily weighted coolies were glad to gain the safe side. In winter an additional danger is caused by falling masses of snow for which reason a man is stationed at the spot to warn travellers.

A little further on we were shown a less abrupt slope down which, on the day before our arrival, a native had rolled some 150 feet, bringing up fortunately in a clump of shrubbery. The poor fellow had superfluously increased the depth of his descent by beginning it from the branches of a tree out of which he fell. Being very thickly clothed he broke no bones, but his face was terribly damaged. When we arrived he was beginning to recover, after an insensibility of fourteen hours.

We were surprised to be overtaken, at Ai-chuo, by the military officer of Ch'iao-chia, who, anxious, as he said, for my safety, had thought it better to come and escort me himself. Strangely enough, almost as if to prove the danger of the track, his servant had fallen over the edge, but in one of the least precipitous places. Although he had only gone down about thirty feet, in two bounds, he seemed seriously hurt and had to be left behind in charge of the cottagers.

The stream which has excavated the floor of this ravine probably enters the Tung-ch'uan river somewhere near its mouth (see Garnier's map). Various ways in which a torrent wears out hard limestone may here be studied from abundant examples. High upright bluffs—there is a splendid instance about three miles above Fa-ni-wo, closing the avenue in that direction; solitary towers and pinnacles left standing in the middle of the ravine, and natural bridges, are all met with. At Fa-ni-wo the track crosses the torrent by a broad natural viaduct; in

other words, the torrent disappears into a cavern from which, after a subterranean passage of several hundred feet, it reissues.* The tunnel was only opened in 1859; before which date the now perforated *bund* of rock was the dam of a lake. The water is said to have burst through underground suddenly, leaving a large expanse of its bed, now a cluster of paddy-fields, high and dry. *Fa-ni-wo* means, and is, a "mud-nest."

From that village to Wei-ku, on the bank of the Niu-lan river, we journeyed for three days over a range the highest pass of which we crossed at an altitude of about 9000 feet. The road is not difficult, unless in such rainy weather as we plodded through. Grassy plateaus well adapted for pasture and wooded glens not too steep for cultivation support a sparse population which lives, in a large degree, on maize and potatoes. Maize keeps for a year, I was told, without becoming mouldy, and potatoes last about half as long. This season, however, the maize had failed, but the natives laughed at the idea of famine since they can procure grain for next to nothing from the lower country. Food is always abundant; the great difficulty is to obtain clothes, money being very scarce. Although to a passing view the people seem plunged in the deepest poverty, they are probably far better off than the famine-threatened millions of Northern China.

From the dangerously steep descent to Wei-ku a grand view is obtained of the Niu-lan gorges—much grander indeed than from the narrow approaches to Chiang-ti where the same river was crossed by the French expedition, and more lately by Mr. Grosvenor. Little idea can be given by mere description of these stupendous gullies. A series of bluffs, height above height, inaccessibly abrupt, rise on both banks to an average of at least 4000 feet above the river, and many peaks reach a much greater altitude. The confined stream is from sixty to a hundred yards broad, with a velocity too great to allow of fair estimate. Speaking roughly, its level must fall some 1200 feet in the twenty miles from Chiang-ti to Wei-ku and has still to fall about 1000 feet before the Yangtzŭ is reached.

Wei-ku pretends to be a market village, but if the residence of a barber be accepted as a criterion it cannot claim the style. The barber is itinerant. The tax-gatherer, on the other hand, is a confirmed resident, collecting a few cash as Likin on the miserable traffic in sugar from Mi-liang-pa. The jurisdiction of Ch'iao-chia T'ing terminates at this point. We crossed the Niu-lan in a ferry-boat sixteen years old, up to our ankles in water, half the crew of four being employed in baling, and after a zigzag climb of 3600 feet found ourselves on the rim of the Chao-t'ung plateau at the hamlet of Shui-kou.

* On the constant occurrence of such phenomena in South-West China, see an interesting extract of a letter from the late Lieutenant Francis Garnier, in the "Introductory Essay" prefixed to Captain Gill's 'River of Golden Sand,' p. [60].—[H. Y.]

The copper for which Yünnan is famous is mined almost exclusively in this part of the province, that is to say from Hsün-tien Chou northwards to the Ssŭ-ch'uan frontier, and from the Gold River eastwards to the border of Kueichou, or a little beyond. The most productive centre is reputed to be in the neighbourhood of Tung-ch'uan. In the low hills immediately south of that city the metal occurs in a pure state, though generally in masses too large to be capable of profitable exploitation. Silver is another valuable product of the same region; the richest mines in the whole Empire, if native opinion may be accepted, are situated close to Lo-ma-ch'ang, a village three or four miles east of Shui-kou. In general the richest fields of both metals lie near the Gold River. No doubt the Lolo country, intervening between this region and the similar metalliferous district of Chien-ch'ang, contains the same resources. The disorders, robberies, jealousies, peculations, and prejudices, which repress mining industry throughout China attain their culmination in this part of Yünnan. Before the mines can be adequately worked Yünnan must be peopled, the Lolos must be fairly treated, roads must be constructed, the facilities offered for navigation by the Upper Yangtzŭ must be improved:—in short, China must be civilised. A thousand years would be too short a period to allow of such a consummation unless some force from without should accelerate the impulse. Perhaps the best hope for the improvement of this region is that the management of the mines may be withdrawn from Provincial control and worked directly under Imperial authority by some such mixed organisation as that which at present regulates the collection of the maritime customs.

There is a good deal of cultivation on these downs in the neighbourhood of Lu-tien and T'ao-yuan and round Chao-t'ung Fu, but the greater part is untilled. At Shui-kou half my company of coolies, alarmed by the widespread apprehension of a Lolo invasion, broke into rank mutiny and made for the Chao-t'ung road; but we had little difficulty in replacing them and rather gained by their desertion, which taught us how to economise carriage. After traversing ten miles of unproductive slopes we descried, near Hui-lu-ch'i, the surprising and pleasant novelty of a *cartroad*, along an open vale grown with maize and buckwheat, and bordered by the red-leaved lacquer-tree, the trunk of which is seamed with black tiger-stripes, the scars of incisions through which the lacquer has been drawn. Farm-houses were now numerous, and many a rude cart built exclusively of wood without a particle of iron was laid up in ordinary at their doors. Ku-chai, where we were glad to find rice, wheat-flour, and a plentiful provision of oil, is the first village worthy of the name which we had seen since leaving Ch'iao-chia. We travelled twenty miles or more along this fortunate vale between low ranges which retain a few vestiges of forest. The pasture-land supports large flocks of sheep, and cattle of a dwarfed race.

A cow is worth about 16*s*., and a sheep about 4*s*. A pony suitable for plough-work fetches 40*s*.

The Chao-t'ung plateau should rather be regarded as a basin; its waters either disappear into the ground or converge by circuitous channels into the Ta-kuan river. A high rim prevents their entering the Niu-lan or (directly) the Yangtzŭ; a fact which seems to show that the gorges in which those rivers run have been split open by upheaval. We ascended this rim as we quitted the vale, and at Pai-fa-ch'i, a hamlet which we reached on the 30th, we had risen to a height of nearly 9000 feet above sea. There are poorer communities in the world than that of Pai-fa-ch'i, but it may serve as a specimen. The hamlet is composed of six huts, including the custom-house, all built of wattle and dab, the latter being cow-dung, since the local mud will not stick. The largest hut measures 24 feet by 10; to secure it against the fierce winds which sweep over the downs, its walls are propped on the outside with poles. A rude plough, two hoes, a flail, an axe, three buckets, a tub, a table two feet high, two stools six inches high, and a comfortable looking wicker bed strewn with hay, form the inventory of the furniture. The goodman is blind, one side of the housewife's face is black, and the child has a stiff knee. The six huts lodge forty people. To build a hut costs 13*s*.; a year's rent for the same is 3*s*. 4*d*., but nobody who can afford to be absent stays here in the winter. The custom-house is also of wicker and cow-dung. The staff of officers consists of a commissioner and four tide-waiters—an eighth of the population. The office furniture is a bed and a hole in the ground, which latter the Commissioner supplies at his own expense with a fire of oak charcoal. Affable as his kind generally are in matters unconnected with business, he invited us to eat our breakfast in this apartment, but as there was not space to stand upright in we preferred the more capacious hut next door. He collects what are called "fourfooted dues"—an *ad valorem* levy on cattle, sheep, ponies, and pigs—and annually returns a total of nine pounds sterling to his superiors, besides supporting himself and under-strappers on the receipts.

Here we were informed that near Lo-ma-ch'ang more than forty silver mines are intermittently worked; that the most productive, called Shih-tzŭ-nao ("Lion-skull") yields eight ounces of silver for every pound of ore; that the rock is exceedingly hard, and that the miners keep large fires burning for ten days together in order to soften it. That the workmen gain little profit, but are enabled to live somewhat more luxuriously than farm-labourers. That before the Mohammedan troubles the mining inspector, resident at Lu-tien, made Tls. 50 (15*l*.) a day by his appointment, but that at present he makes nothing. That in consequence of disorders and maladministration very little work is now conducted, and that the surrounding country is more impoverished than ever.

A few miles beyond Pai-fa-ch'i we reached the point where the track attains its highest level, viz. 9700 feet. A venerable but blasted pine, the only tree within sight, marks the position. The downs are here covered with a dense growth of dwarf bamboo a foot or more high. As we turned a knoll, one of those discoveries which so seldom fall to the fortune of a modern tourist flashed upon me. About twenty miles distant to the north-west, in a cloudless sky, rose a stupendous boss, the culminating point, and the terminal, of a snowy ridge some fifteen miles long. The height of the ridge can only be estimated, as I possessed no means of measuring low angles conveniently. An approximation may however be easily made since the snow lies low upon it during the hottest season. Captain Gill found the snow-line in Eastern Tibet at about 17,000 in lat. 30°; here our latitude is 28°, and we must allow at least a thousand feet for the snow-covered part; 18,000 feet seems therefore the lowest permissible estimate. The predominating boss, which resembles a cap of liberty, rises probably 2000 feet higher. The summit falls to the Yangtzŭ in a series of terraces, which from below appear like parallel ridges, and abuts on the river with a precipice or precipices—which must be 8000 feet above its waters. The undulations of the plateau prevented a fair sight of the gorges beneath, and a turn in the river shut them from view when we descended to its bank. The next visitor, it is to be hoped, will *do* the region more completely. I was standing too near those overwhelming heights and depths to be able to judge calmly of their proportions—physically too near the gorges, and mentally too close to the liberty-cap, although, as I have said, it was some twenty miles away. Later and mature reflection has brought little result beyond a violent desire to go there again.

Being in Lolo-land the mountain is of course inaccessible to the Chinese; but it is a conspicuous object to the natives of the Yung-shan district, who call it "T'ai-yang Ch'iao"—the "Sun-bridge"—surely a magnificent name, and not inappropriate; the setting sun traverses the crown of that portentous causeway.

The mountain-ranges of Ssŭ-ch'uan run, with very little exception, in a direction varying from N.E. to N.N.E., and the Sun-bridge abides by the rule. It seemed therefore almost certain that the Gold River must follow this same general course from Ch'iao-chia to P'ing-shan, and that the elegant northward meander with the graceful turn eastwise provided for it by cartographers is a bit of freehand drawing. This surmise turned out to be correct. The Jesuit surveyors, it is probable, did not visit the stretch between Ch'iao-chia and Fu-kuan-t'sun, but trusted to such information as was obtainable in the neighbouring towns; in their time both banks were in Lolo territory, and indeed they were more concerned with the position of cities than with the minute delineation of rivers and ridges.

Continuing our journey we began to find that the Chao-t'ung plateau

here breaks up into a number of parallel ranges enclosing deep and narrow ravines. At the end of two short marches a sudden turn brought us into the grassy hollow of Hua-ku Lake,—lake being in this instance a euphemism for marsh. Thousands of sheep are here bred for the sake of their wool, which is manufactured into Lolo felt. We bought a sheep for 2*s*., returning the skin to the shepherds. The animals are said to suffer greatly from foot-disease, caused by the dampness of the climate. Rain had here fallen for forty days, with three days intermission, and came on again towards evening with a wild wind. It needs not to describe the misery of a night spent on a bed of hay with a pigsty beside it, a sheepfold next door, and a pair of cats caracoling and romping about the place in the hope perhaps of keeping themselves warm. The cold blast whistled through the cow-dung and wattle, scarcely allowing our bamboo fire even to smoulder. Growing reckless towards morning we woke up the housewife and desired her to turn the pigs out of doors and to take the cats into bed with her; for the interstices of the wattle, though close enough to exclude pigs, allowed free admission to cats. She acceded to this exorbitant request with apologies instead of murmurs, and about noon next day we parted on the best of terms. Here we began a continuous descent, but delayed by the rain, did not reach the Yangtzŭ bank at Yang-liu-shu until the 4th, after two days' downhill, a horizontal distance of eight miles, and a vertical one of 8000 feet. During the first day we passed through the most impressive scenery of Western Ssŭ-ch'uan, but the deep gorges bounded on the further side by the immensities of the "Sun-bridge" must be described by the next traveller; all was invisible to us. Indeed the fog was so little translucent that we were several times brought to a standstill by the impossibility of seeing the path under our feet.

Miao-wa, half-way down, is a hamlet not more than 70 yards square, surrounded with a bastioned mud-wall 20 feet high. A little further on we passed on our right the small city of Yung-shan, high up on the slope. It is said that the geomancers who selected its situation weighed the soil of the neighbourhood bulk against bulk, and choosing that which showed the highest specific gravity, built the city upon it, as being likely to afford the most solid foundation. The weather had cleared, and we could now see here and there the precipitous sides of the "Sun-bridge" peering blackly through rents in the white curtain of mist. Now and again we could just descry the summit, but its dazzling fields looked more like gold than snow, and from our low level the irregular edges of the terraces were projected like peaks upon it. In the north-west, beneath a patch of lighted sky, a long jagged crest sharp and clear as a new cut saw, and not very different in colour, showed the continuation of the range towards and beyond Lui-po-t'ing. From such a position the whole system seemed a wilderness of peaks;

but when we afterwards gained a higher level it became evident that the tendency is to form plateaus rather than pinnacles.

As we were plunging down the steepest of gorge-roads among cliffs and cascades we met General Chung, the commandant charged with the protection of the district against Lolo invasion. The old gentleman, who was on his way to Yung-shan, greeted me very kindly by dismounting, taking off his flapping straw hat, and shaking hands. During the T'aiping wars, he said, he had made friends with many foreigners; and meeting me suddenly in this wild region reminded him of those stirring times. Hearing of my approach he had left instructions at his quarters of Mi-t'ien-pa to make me comfortable. I think the veteran was unfeignedly glad to see me.

Soon we struck the bank of the Gold River near the hamlet of Yang-liu-shu, in lat. 27° 50′, where it issues from the mouth of a narrow defile, the height, breadth, and depth of which could perhaps be more easily measured than described. Until Her Majesty's Foreign Office supplies its servants in Western Ssŭ-ch'uan with delicate scientific instruments, or allows them to write reports in blank verse, little justice will be done to the Sun-bridge and its gorges, unless some Humboldt come this way. The stream, now a reddish-yellow mud-colour, runs in rock-strewn whirls and races which snub any question about its navigability. Yang-liu-shu and its neighbourhood is much favoured by Lolo invaders as a point for crossing into Chinese territory. Many an anecdote was told us about their inroads. They were driven across the river in the reign of Yungchêng—a hundred and fifty years ago—and up to the present time the Chinese authorities have contented themselves with maintaining that line, though in a very incompetent manner. General Chung has only 300 soldiers to guard 60 miles of frontier. When the Black-bones project a foray they send heralds several months beforehand to proclaim their intention, and the Chinese, knowing that the severest reprisals would follow any ill-treatment of these emissaries, allow them to return, accept their warning, and retire to a safe distance or assemble in a fortified position. The invaders cross the river at unwatched places in boats built of thin plank (more probably coracles such as may be seen on the T'ung river,) capable of floating six or seven men, and so light as to be easily carried by one. Early winter is the season they generally affect for their forays. They do not kill unresisting people provided a nominal ransom be paid or promised; but vigorous youths, young women, cattle, and salt, are unsparingly carried away. If resistance be offered they destroy crops. Their most trusted weapon, the spear, is a twenty-four foot pole of Ch'ing-kang wood—a kind of oak—headed with a spike four or five inches long. They have no fire-arms, but commonly use crossbows. The country people seldom make any resistance. Captives who have been carried off may be ransomed, but the price is generally too high. The goodman of my lodging

outside Miao-wa has seven relatives now in captivity, and in twelve years his cottage has been nine times burnt out. A woman whom we met had been delivered from bondage at what seems the moderate valuation of sixteen taels—say 5*l*.—but such a sum, I was told, is difficult to raise. Great numbers of Chinese, for the most part slaves, are to be found in the Lolo country; those born there, or captured young, and who speak the language, are very well treated; many even do not care to return; but when I asked three or four refugees what they had found to complain of, they replied with derisive laughter—"They make us shepherds and woodcutters and only give us one buckwheat cake a day."

Seeing therefore that the natives live almost next door to slave-hunters, it is not surprising to find all the farm-houses fortified. Here indeed, every Chinaman's house is, literally, his castle; generally a high wall on four sides with a bastion at opposite angles, and sometimes a donjon tower three stories high in the interior; the whole built of mud, and perhaps girdled with a thick cactus-hedge. Additional buildings being often required, fresh works are appended to the original defences, so that in course of time a very picturesque confusion of brown towers and irregular walls results. The interior of such holds is less attractive, being filthy beyond expression.

Persons unacquainted, or superficially acquainted, or one-sidedly acquainted, with the Chinese *régime* will ask how it can be that this paternal government spends ridiculous millions in the recovery of Kashgaria and Kuldja, and leaves thousands of its nationals, within the bounds of its patrimonial eighteen provinces, in a condition or an imminent possibility of arrant slavery. It would be hopeless to think of contradicting such an argument by the authority of the sparse and ignorant witnesses I have been able to interrogate. But fortunately for the interests of truth and credibility I can adduce the evidence of a European, who had the ill-luck to be overtaken by a Lolo foray in the country between Yung-shan and Takuan. It will be observed that he regards the question from a Chinese point of view. As an educated Frenchman, long resident in Western China, he may be considered capable of judgment, and a devoted missionary will not be refused the privilege of credence. For that matter, the mixture of pathos, humour, and piety, which composes his narrative, is luminous with ingenuous veracity.

"In the beginning of 1860 I intended to make an excursion into the country of the I-jên, not only with the object of promoting the conversion of those tribes, but to obtain the release of several Christians who had been carried into captivity. Unfortunately I had laid my plans without consulting the Mantzŭ. The season in which those brigands commit their ravages being already well advanced, we hoped to keep clear of

them, but as will be seen in the sequel our expectation was disappointed. The Mantzŭ and the I-jên are one and the same people; they treat one another as brothers, and indeed are brothers. The only difference is that the I-jên live in submission to the Chinese Government, paying taxes and allowing the officials to visit them, but at the same time retaining complete authority over their own people. The Mantzŭ, on the contrary, have never been reduced to subjection; too feeble to oppose the Imperial forces they have chosen to abandon their country rather than endure a foreign yoke and have taken refuge in the mountains called Liang-shan, which form a considerable plateau, protected by inaccessible heights, between the provinces of Ssŭ-ch'uan, Yünnan, and Kueichou.

"When I started on the 2nd of January I had heard nothing of a Mantzŭ incursion, but on the way, news came of the inroad of a body numbering 3000. It was near noon and a few miles more would have taken us out of danger, . . . . when on a sudden three of the bandits ran out of a pine-forest towards us and cut off our retreat. I at once gave the alarm and cried, "Sauve qui peut" at the top of my voice, but alas it was too late. One of our party who was on ahead managed to hide himself in the underwood and was lucky enough to escape discovery; the rest of us, three in number, took to flight; two of our enemies stopped to ransack my bundle which had been abandoned to them, while the third followed us up; but the yells of the whole band, which was approaching, took away all thought and power of resistance. My servant, the first to be overtaken, received six thrusts of a spear, and after being stripped of all his clothes was left for dead. Meanwhile I ran with all my might, in company with the man who remained, and already began to have hopes of escaping, when we met another band waiting for us in the way. Seeing them come on, ready to run us through with their spears, I called out that we would surrender. Eight or ten Mantzŭ throwing down their weapons, immediately rushed upon me, and literally raised me off my legs clear of the ground; one pulled off my shoes and socks, another my coat, shirt, &c., all working simultaneously, so that the business was soon over. I felt giddy and dazed during the operation, especially as there was no knowing how it would end, but I remember that I repeated without cessation an invocation to Jesus and Mary.

"Having torn up my clothes, and given every man his share, they set off again, taking me with them. Being among the first to arrive in the plain, we made a short halt to eat part of our booty, pigs, fowls, ducks, &c. Here it is every one for himself; those who had looted anything partook of the banquet; their less fortunate comrades watched them at work. As for myself, squatting under an old wall, I did my best to give the wind as little hold as possible. When any of them came near me I said in a respectful tone—'Master, it is very cold; lend me a garment no matter what, and I will return it.' Many of them laughed, the better made no reply, some asked if I would like a flogging to warm my

back; but one, more compassionate than the rest, gave me a little bit of a cloak, which although too short was of the very greatest service. May the Lord recompense him for that good action.

"By the time the brigands had devoured the few pigs they had killed, the whole band had assembled, composed of from 1200 to 1500 men. It was now getting late, and every one looked for quarters; a good many camped out on the open plain, and the rest found lodging in buildings which the Chinese had deserted on their approach. The troop to which I belonged retired to a good-sized house which sheltered us from the rain, snow, and wind, most luckily for me, for I was not in a state to brave the open air in such weather. Our installation was effected without much ceremony, and I had to wait outside until everybody was suited. The day's chase having been pretty successful, it was merry in camp that night though without much charge for cooking. Nothing can well be simpler or speedier than the manner in which these people prepare their food. Having lighted a great fire with our host's benches, tables, and beds, they threw into an iron pan four or five pigs, large and small, turned them two or three times with a stick, and the beasts were considered to be cooked, although the hair was hardly half singed. The head cook then performed his office and every one came up for a piece according to his rank. I have never been able to understand how those rude gullets could so easily swallow the bristles of the animals. To eat raw flesh is nothing out of the way for people of their condition; but not to remove the hair seems a novelty. By way of dessert they brought in an ox, which was prepared in the same way, hair, hide, and all. Though I had eaten nothing that day, the idea of claiming a share of the banquet did not occur to me; indeed the thought of being offered any was alarming, for it must be remarked that one is obliged to eat all they offer, under pain of incurring their indignation. If any one shows signs of disgust he will have to swallow the filth which they will at once add to his ration, and will get beaten into the bargain. I was beginning to think myself safe, when the man who had given me the cloak came up with about a pound of flesh, all red and reeking with the natural heat of the animal. It may be imagined how embarrassed I was, especially when I saw that the man was watching how I should get through it! My condition was quite wretched enough without making it worse by betraying any repugnance, so I made the best of it by biting off four mouthfuls, which took many a turn in my mouth before passing into my stomach. But when he happened to look the other way I seized the opportunity to hide the morsel, and for want of a better place put it between my feet. He returned a moment after and asked me if I had eaten it all, and when I replied 'You have given me a great deal too much; I will finish it to-morrow,' the good fellow picked it up from where I pointed to it with my finger, and ate it very comfortably, although it was quite cold. This induced me to believe that he had deprived

himself of it for my sake. From that time forward we were very good friends, and I have no doubt that he did much subsequently to set me at liberty.

"After supper I was chained up, but contrary to general usage my hands and feet were left free, and I managed to get a little sleep. The forenoon of the following day was a trying time. My friend and benefactor had gone to pillage in the neighbourhood. Besides going without breakfast and dinner I had enough to endure, and they would hardly allow me to approach the fire. Some would pull my hair, or give me a kick, or a box on the ear, or a blow with a pipe; others amused themselves by plucking my beard, this one pulling out the white hairs and that one the black, while a third, finding the operation tedious, brought a flaming brand and roasted my chin unmercifully. More than once I had a very close view of knife or spear, but there was always some helping hand to put aside the blow, or some tender heart to intercede. At last they sent me to turn the mill, and this was the end of my miseries and the beginning, I may almost say, of comfort. I had scarcely begun work when all the chiefs came to look on; some wondered at my white skin and others made sport of my awkwardness, but before I had ground many handfuls they all cried out together, 'That will do. Come and warm yourself!' It was quite time, for I was all stiff with cold, and could only walk slowly and with great difficulty, so that it was easy to see that I could not long endure such a life. The Mantzŭ accordingly offered to ransom me for 1000 ounces of silver; a little later they reduced the demand to 50 ounces, with 1600 lbs. of salt, and twenty pieces of cloth. 'Well,' I said, 'you do not require overmuch, but how can I raise money here, or find cloth, or borrow salt? You have taken everything I had with me; what can I offer you now I have nothing left?' My arguments were so clear and just, even in the eyes of these brigands, that nothing more was said about a ransom.

"'Do you know who we are?' one of the chiefs then asked me. The question seemed a difficult one to answer, since I did not know what he was driving at. I got out of it with a bit of Gascon slyness, which could not however have deceived anybody, for the chief immediately added 'Well, well! you are frightened to-day. We know you Chinese call us thieves and robbers, but it is you who are the robbers. All this country once belonged to our fathers; they had always been its masters and peaceable possessors until the Chinese came and unjustly expelled them. We were the weaker, and had to yield; our country was neither sold nor given away; we come to collect the rent. If you retire to your own territory you will find that we shall not follow you.' 'But, at any rate,' I replied, 'you need not kill the sick and feeble.' 'If we did not,' said he, 'who do you suppose would follow us? They would all pretend to be sick, and we should never make a single capture.' Unfortunately for the Chinese Government, this is true. It is admitted that the first emperors

of the present dynasty gained possession of Yünnan by the violent expulsion of the aborigines; but it remains to be known whether the latter gave occasion to severe repression by their brigandage.

"During the forty-eight hours, more or less, which I spent with the Mantzŭ, I noticed a fact which has singularly surprised me. I had always supposed them to be an exceedingly corrupt people, for such is the reputation which the Chinese have given them. I can nevertheless testify that with the exception of a few expressions, rather vulgar than indecent, I saw nothing in their manners at which even a Christian need blush. Of course this is no proof that these bandits are always so well conducted when they return to their mountains, but it shows at any rate that they can behave well when they choose, even in the midst of an incursion which is favourable to every abuse of power.

"I thus passed the afternoon of the 5th, and as my masters had shown me a certain kindness, I hoped to be better treated henceforward; but I was soon undeceived; one of my fellow slaves whispered in my ear during a moment when we were not watched, 'Things are going badly—they have resolved to kill you to-night after supper, or before starting to-morrow.' I thanked the man with a nod, for it was unsafe to talk much. Seeing no way of escaping death, I thought of preparing for it the best way I could. Two hours went by in this manner; night had fallen; several had finished supper, and some were still eating. I felt sure my last hour had arrived, especially when they came and took away the little cloak which covered my shoulders. In this extremity my good angel, who doubtless watched over me, inspired me with the idea of making what is here called the *Ch'iu-ch'ing*—the appeal to kindness—and this is how I acquitted myself of the ceremony. Our band was divided into five groups according to the number of rooms in the house; I went to each group and in the attitude of a suppliant exclaimed, 'I appeal to the goodness of your hearts!' The plan succeeded even beyond my expectations. The Mantzŭ, flattered to see me on my keees before them, granted me not only life but liberty as well, which I should never have dared to ask for. In fact, no instance is known of their ever having released a prisoner; it is 'March or die.' It happens now and then that at the moment of capture they dismiss some of those whom they have despoiled—an old woman, for instance, or a disabled man; but the encampment once entered there is no leaving it. This is not merely a general rule, but one which has no exception whatever. Blessed be the name of the Lord who for my sake softened the ferocity of these men! Death had no great terror for me, but the thought that my parents, my brother missionaries in China, and my friends in Europe, would remain in cruel uncertainty about my fate was excessively painful.

"I was beginning to breathe again and to feel the pleasure of life, and almost of liberty, when the man who had seemed all along to take an interest in me drew me apart and said, 'There are several bad people

among us who, notwithstanding their solemn promise, are quite capable of giving you a stab with a knife before starting to-morrow. You had better be off to-night.' 'Where can I go?' I replied; 'the mountain is full of your people, I am ignorant of the way, the night is dark, and I have neither clothes nor shoes; even supposing these difficulties overcome I should still die of hunger and cold. Good young man, make your mercy complete! Let me spend this night under your roof and I will start to-morrow at daybreak!' But it was in vain; I had to go. I cannot conceive why they wanted to get rid of me at such an hour. They must have had some other motive than the wish to put me beyond reach of danger.

"I had scarcely taken a dozen steps, however, when, feeling the utter impossibility of going further, I came back and said, 'Kill me if you like! It makes no difference whether I die indoors or out.'

"The bandits, generally little accessible to compassion, could not help saying that I was much to be pitied, and assigned me a corner of the house to sleep in, where by a stroke of luck I found a few handfuls of rice-straw to spread over me and retain as much warmth as possible. You would not believe how cold and long that night was! Next morning no one thought of hurting me. When the place was a little cleared they let me come near the fire. Seated on the ground, I saw with pleasure that the time for starting was drawing nigh, and while I was impatiently awaiting it, a wag of the party, thinking to divert his comrades at my expense, filled a pot with cold water and came and poured it over my back. This attention of his made everybody laugh heartily, myself excepted. The rascal was about to indulge me with a second shower-bath, but I did not give him time; I gained the door with all despatch, and fear made me find a remnant of strength in my legs when I saw the whole party join in the chase and pelt me with stones. I very soon perceived, however, that they only wished to hasten my flight, and did not really intend to catch me; nevertheless, for greater safety, I jumped into a rice-field, being pretty certain that they would not care to paddle after me through the slough. I purposely fell first on one side and then on the other, pretending not to be able to keep my legs, so great was my dread of being called back in earnest. At last I hid behind a hillock, and when the Mantzŭ lost sight of me they started, leaving large fires burning in the house.

"Sitting and half lying in the mud, it was long ere I ventured to budge. When all was quiet I risked a glance out of the corner of my eye, without lifting my head too far, and at length put my nose in the air and saw the last of the Mantzŭs disappearing over the ridge of the mountain. After making sure that I was really free and that not one of my enemies remained, I went back to the house, where I could at least warm myself at ease; but it was not prudent to make too long a stay. The owner would not fail before long to come out of the cave in

which, with his family, he had taken refuge; and it was to be feared that in the first moment of surprise, and not knowing me, he would make me pay very dearly for the havoc which the robbers had committed in his dwelling. As quickly as possible, therefore, I made myself a broad girdle and a little cloak of straw, and having come upon a basket which was not altogether unlike a hat, I filled it with straw, stuck it on my head the best way I could, and took joyously to the road, thinking much less of present difficulties than of the dangers which I had already encountered.

"In the evening I reached a small (Chinese) village, the inhabitants of which had only partly returned. I had great trouble in finding a lodging; nobody would take me in, because I had no money. I remember that I went from door to door saying the handsomest things in the most doleful tones, without any success. Some, while leaving me in the streets, would recommend me to be patient, remarking that times were bad and that, moreover, I was not the only unfortunate—with other truths of a similar nature. These were the most civil. Others would declare flatly that I was a thief, and that their houses were not meant for people like me. I saw the moment coming for me, not to sleep, but to die, in the street of that inhospitable village. My entreaties and my courage were alike exhausted when I heard some one calling me—'Old fellow! old fellow! come here!' It turned out to be one of those who had refused me shelter. The good man gave me supper and performed that night an act of charity which, to those who know what the heathen are, will seem incredible. There was only one blanket in his house, the others being hidden in the mountain for fear of the robbers. Well, my host had kept this solitary blanket for his own use, and yet he lent it me for the night without being asked, sleeping himself in his clothes on a bench beside a small fire which he relighted more than once without succeeding in getting warm. I am firmly persuaded that the Lord, in his mercy, will give that heathen the Faith, of which he already performs the Works, and I earnestly recommend his conversion, as well as that of his family, to your good prayers."

It may be affirmed with something like certainty that the above is the only paragraph of European literature which makes authentic mention of the Liang-shan Lolos. I need make no apology for extracting it from the 'Annales de la Propagation de la Foi' (latest edition, vol. xxxiv.), since while it illustrates and confirms the results of my inquiries about the redoubtable Black-bones, it gains interest and value from a knowledge, which the writer did not possess, of the large extent of territory occupied by them. The frontier, at almost any point of which Chinese may be hunted for in the manner recounted, has a length of more than 300 miles and lies wholly within China Proper.

It is pleasant to be able to add that although the excellent missionary

has since encountered dangers of a not less formidable kind, his prospect of martyrdom seems more distant than ever.

We kept along the bank as far as the village of Huang-kuo-shu, where, to cut off a wide bend in the river, we climbed 3000 feet up a mountain-spur to Ya-k'ou, a scattered hamlet of fortified cottages. A little further on we selected as our lodging a large farm-house, girt with walls and towers, the only occupants of which were two Lolo women; they told us, however, to make ourselves at home, saying that the master was away, but would doubtless be glad to receive us, and that they would send to inform him.

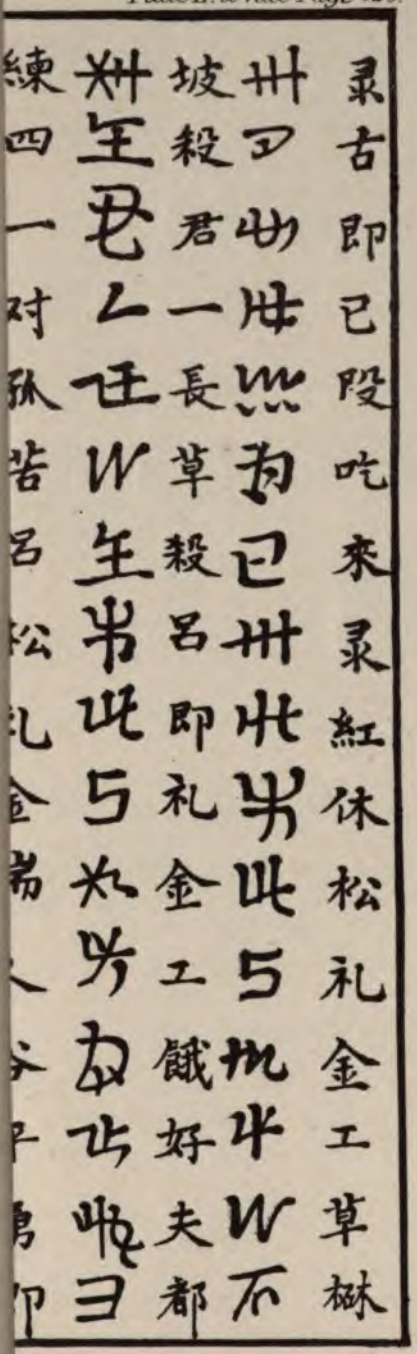
It was here that I made the most interesting discovery of the journey. The master did not return until next morning, but in the meantime we learnt that he was a Lolo of rank and that this part of the country on the right bank of the Gold River, over which his family once reigned, had submitted to the Chinese under his grandfather. He had received a Chinese education, and, except in the matter of intermarriage, had adopted Chinese forms, though still maintaining relations with the independent tribes on the opposite bank. The room in which I was installed measured some 25 feet by 14 feet, and one-third of the floor was covered to an average depth of about 18 inches with bundles of waste manuscript and printed papers. The Chinese make such collections with the purpose of solemnly burning them, from a pious respect for the art of writing. Now, while travelling along the border, I had been many times assured that the Lolos possess books, the power of deciphering which is confined to their priests, or medicine-men, or magicians, or whatever their correct style may be. The Chinese call them "*tuan-kung*," a word which is generally translated by the uncouth term "thaumaturgist."* I had made every effort to obtain one of their books, but without success. Lu, the Ché-po chief, promised to send me an exemplar, but although I have since corresponded with him no Black-bone classic has reached me. Here then at Ya-k'ou, the point where our route quitted the immediate frontier, an expiring hope prompted me to examine the mass of fugitive literature which encumbered the floor of my chamber. After a hasty dinner I summoned my native clerk and we began an exhaustive exploration of thousands of documents. The search was not so difficult as might appear, since the printed papers, mostly proclamations, placards, and hand-bills, formed three-fourths of the mass and were packed up separately from manuscripts. The Lolos do not possess the art of printing, and we had therefore only to examine the written documents. These were principally drafts of letters, rough accounts, and children's copy-books, the latter in great number. Not wishing our unhandsome

* This looks like the word *tuin*, which was applied by the Mongols (or properly by the Uighurs) to their lamas. See the references in 'Cathay and the Way Thither,' p. 241, note.—[H. Y.]

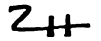
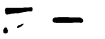
inquisitiveness to be made public, we had frequently to relax operations on account of interruptions, so that we did not complete our work until soon after midnight. We found nothing to our purpose in any of the packages; but under the last few, almost in the furthest corner, we discerned with gloating eyes the scrap of writing of which a facsimile is appended—a specimen of Lolo characters with the sound of each word, or syllable, approximately indicated in Chinese. (Plate II.)

It might have been expected that the Lolo writing would turn out to be some form of Pali. It shows, however, no relation to that system, but seems to take after the Chinese method. In any case the discovery possesses no small value and raises so many interesting questions that a little exultation may be pardoned. A new people may be discovered anywhere, a new language any day; but a new system of writing is a find of exceeding rarity. Many a rival galled the kibes of Columbus, but the achievement of Cadmus has been deemed so astonishing that his very existence is now denied!

I did not care to carry off the original—"convey" the wise it call—but yielding to a subterfuge which no casuistry can palliate, I made my clerk copy it on a superposed sheet of transparent paper and have since had it cut in wood. When the master returned next morning I asked him if he would allow me to keep the original; but, as we had foreseen, he refused, nor could we obtain from him any consistent explanation of the meaning of the document, although in all other respects he was profusely obliging and hospitable. It is necessary to recount the above discreditable details for the purpose of putting beyond doubt the authenticity of the document and of showing that it was not made to order. Hearing in the course of the forenoon that a lettered medicine-man from the opposite bank was in the village, I asked our host to send for him, which he at once did. The medicine-man, a tall and robust Lolo, with his horn concealed under the Ssŭ-ch'uan turban, appeared to have somewhat reluctantly accepted the invitation, and for a long time I could hardly elicit a word from him. The exhibition of weapons and instruments excited little emotion; but his curiosity was at last pricked by a Nautical Almanack which happened to lie open at a page of Lunar Distances. He carelessly indicated a line of figures and, speaking of course Chinese, asked what they meant. Now by the greatest luck in the world I remembered the Lolo word for *moon* since it is a remarkable word which exhibits the Welsh aspirated *l*; and furthermore, I had a rude acquaintance with the numerals; so that it was easy to reply in the medicine-man's own language "*Hlo-po t'su-ha-ni-fo*"—"Moon, a hundred and six." Whether the translation was correct, within a hundred degrees or so, was of small account; indeed it is quite possible that he may have understood me to say "a hundred and six moons"; but from that moment the ice was broken and communication became easy, mostly, however, to his



advantage, for he was so curious to learn all about the moon and the Greenwich Almanack that it was difficult to change the subject. At last I asked him to write me a few words in his own characters, and here is what he wrote, with the interpretation thereof:—

| | | | |
|---|---|---|---|
| One | | Horse | |
| Two | | Ox | |
| Three | | Sheep | |
| Four | | Fowl |  |
| Five | | Dog |  |
| Six | | Pig | |
| Seven | | Water | |
| Eight | | Fire | |
| Nine | | Red | |
| Ten | | A- | |
| | | Tchu | |

The last two characters are the name of the writer. When he had got thus far a servant came in and delivered a message to him and to my host, which caused them to hurry out of the room with almost disorderly haste, and I never saw either of them again. Their flight was explained, a few minutes afterwards, by the arrival of three military officials from Mi-t'ien-pa, who came to receive me by General Chung's order. It is easy to understand that a Black-bone sorcerer would feel very unsafe in such society.

From Mi-t'ien-pa, which is a comfortable village a few miles down the slope, a direct and easy track leads over the mountain to Ching-ti, but wishing to see something more of the Sun-bridge and his satellites, we

preferred to make a detour by which we could travel in full view of them. The chart gives, probably, a fair general view of the system, but of course makes no pretension to minute accuracy. West of the Sun-bridge, and parallel with it, is a similar ridge, and further west again is yet another, of which we could make out little but its pearly snows. A long, narrow, and exceedingly deep glen runs straight in the direction of the third range, and no doubt brings down a large stream of water; but it was far too profound and obscure for us to descry its floor. A road leads through it into the heart of Lolodom, and I was told by the medicine-man that under proper sureties it may be travelled with safety. Few more desirable explorations could be projected than a journey up that alluring avenue.

Lung-t'ou—"Dragon's Head"—is the name of a line of precipices which terminate a high plateau further north whereon snow lies during eight months. On a subsequent journey I caught sight of this elevation from a point 60 miles to the north of it, at the door of a smithy a mile and a half west of Lu-lu-p'ing. From that distance little can be distinguished except that it has an irregular surface of large extent—perhaps a mean diameter of 15 miles—and cannot be much less than 12,000 feet above sea. The region which intervenes between the Sun-bridge and the Dragon's Head appears to rise in two, or possibly three terraces from the bank of the Gold River. On the 9th of October all these heights, except the terrace immediately beyond the river, were covered with snow, while we were travelling 5000 feet above sea in a mean temperature of about 60°.

The rest of the journey calls for little remark. We may almost be said to have discovered Lui-po T'ing, a city the position of which has always been a puzzle to map-makers in consequence of the erroneous course which they have assigned to the Gold River. We saw enough of that stream to satisfy us that it cannot be navigated, unless with frequent portages, further than a few miles above Hui-ch'i. At Hui-ch'i we forsook its bank and made directly for Fu-kuan-ts'un, a sub-magistracy which I had previously visited when attached to Mr. Grosvenor's Mission. The road crosses a country of no great abruptness, well wooded, not much cultivated, fairly well inhabited, and abounding in waterfalls. We made P'ing-shan Hsien on the 18th of October. One of my latest reminiscences of the Lolos is that of a lady coming down the road near Lan-mu-p'ing, whom I took at 60 yards' distance for a French sœur de charité, not reflecting how absurd it was to expect such a rencontre in Yünnan. Nevertheless the resemblance of costume was so close that I actually called a halt and awaited her approach; but when she drew near, the sight of a baby which she carried on her back, dispelled the illusion.

Several months after the above was written I was fortunate enough to secure, through the kind offices of the French missionaries, an original Lolo manuscript of eight pages, which had been obtained from a Lolo chief near Fu-lin. The sheets—numbered from 1 to 8 [Plates adjoining

To face p.128.

To face p. 128.

To face p.128

To face p.128

1 to 8]—have been carefully copied from it, page for page and line for line. I am quite ignorant of the nature of the work, and am even unable to declare at which end it begins.

### Ancient Stone Monuments.

The foregoing narrative will have failed altogether of its intention if it has not succeeded in hinting how great an interest—for the most part an interest in the unknown—attaches to exploration in Western Ssŭ-ch'uan. But the misfortune of the explorer is that he seldom knows where to look, and never knows how much he has missed. The purpose of this note is to indicate one special vein of research which promises a rich output.

A hundred yards or more distant from a country house near Ch'ung-ch'ing, which I have from time to time occupied, lies a mound which is possibly an ancient tumulus; but it has been so eaten into by paddy-fields and effaced by the erection of a modern tomb that its outline is not a prominent feature. Its few square yards of uncultivated sward make it a pleasant spot on which to sun oneself during the rare intervals in which Ssŭ-ch'uan weather combines mildness with sunshine, and it was on such an occasion that I one day detected a straight line faintly delineated on the surface of the turf. Very few moments elapsed before a little removal of soil with a pointed stick disclosed the presence of an oblong slab of sandstone, about seven feet by two and a half, which according to all precedent contained in the records of Aladdin and others should have been countersunk into the mouth of a subterranean cavity. And, sure enough, so it was, although there was no ringbolt by which to raise it. I had therefore to defer lifting it until assistance could be obtained; and since such operations are, in China, punishable by decapitation, or strangling at the least, several weeks passed before occasion served the purpose. When we at last succeeded, after expending much misapplied force and pretentious ingenuity, in raising the slab, we discovered that it was the lid of a rude sarcophagus containing nothing but wet mould, which may have drained in through ill-closed chinks, or have been deposited by previous desecrators. But in any case the sarcophagus lies too near the surface to warrant the inference that it has ever housed a corpse; it is more probably *a blind* to divert curiosity from the situation of the true coffin, which may be expected to repose in some more recondite part of the tumulus.

Nevertheless I was not at all depressed, for a valuable find had already been made. From beneath the head of the lid, which juts over at one end, the landlord of the house had, a few days before, picked out a polished stone axehead of serpentine. When first discovered the instrument was perfect, but the friends of the finder, ignorant of its character and surmising that it contained gold, attempted to break it open by

dashing it against a rock, and seriously mutilated its edges. The tough material offered, as a whole, so stout a resistance to the vandals, that it retains a very presentable and even elegant appearance, and now forms No. 1 of my cabinet of polished stone instruments found in Ssŭ-ch'uan.

That everything must have a beginning is one reason why the collection has not yet extended beyond No. 2, a specimen which owes its discovery to the habit of opium-smoking. In a street in Ch'ung-ch'ing my servant met a smoker scraping the opium-stains from his fingers with its chisel-like edge. The man let me have it for the equivalent of a shilling, and on being asked how he came by it said that he had found it, and another, in a stone coffin in a field near his house. This exemplar, though much dilapidated, is a good specimen of polished flint.

It is therefore undeniable that these objects are found in connection with coffins, though what the connection may be is not clear. The

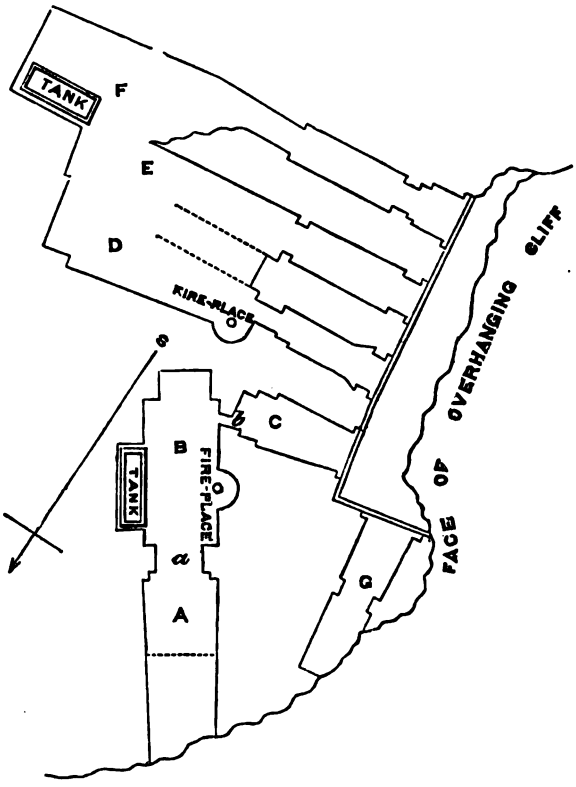



FIG. 6. Scale 16 feet to 1 inch.

natives call them "*hsieh*"—wedges—and conceive that their use was to fasten down the lids of sarcophagi in some unexplained manner. A more plausible supposition is that they were buried with the dead in

conformity with some traditional or superstitious rite; at any rate the theory is impossible that the people who hollowed out these ponderous monoliths worked with stone chisels, and left their tools inside.

It is curious to find in many a farm-house and roadside inn similar sandstone coffers in use as cisterns, though of unnecessary size for the purpose, and to be told that their origin is remote and unknown. However that may be, the explorer cannot help connecting such tanks and sarcophagi with another class of sandstone excavations of which there must exist thousands of shapely and imposing specimens. The first of these constructions—if a perforation can be called a construction—which I visited, is near Ch'ien-wei Hsien, on the Min. The exact locality is indicated on my chart of that river, and the plan (Fig. 6), made on the spot by careful measurement, will help to explain the following remarks.

The series of excavations shown on the plan can only be entered through A, which may be called the porch; the doorway *a*, if it were cleared of the sand which at present obstructs it, would be some 4½ feet high. The distance to which the roof of rock extends over the porch is shown by the dotted line, at which point there are three overlapping lintels. It should be borne in mind that all is part and parcel of the living rock. The uppermost lintel is plain, but on the face of the second is sculptured in relief a couchant animal (Fig. 7), possibly a horse,

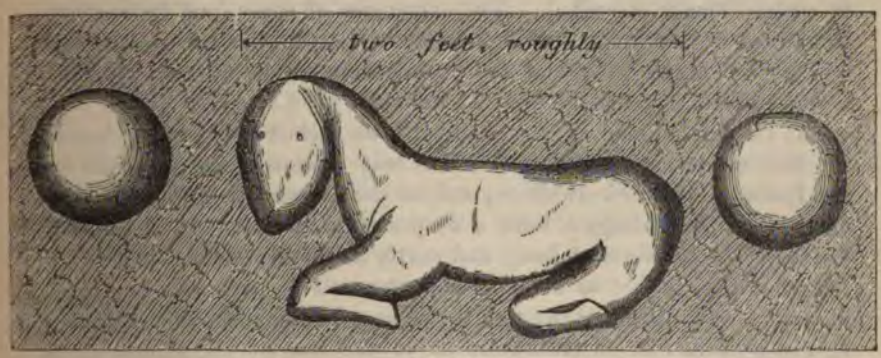



FIG. 7.

between two globes, the carving of which is very much defaced. The lintel immediately over the entrance bears the ornament shown in Fig. 8, also much worn down, although its outline is distinct; so far as its condition will admit of exact measurement, it is just an English foot long. Passing through the doorway I entered a chamber some 12 feet long and six feet high beneath the crown of the low arch into which the roof is carefully rounded. On the left is what appears at first sight to be a sarcophagus, but on clearing out the sand I found that it is hardly deep enough for purposes of burial. Still, it seems too deep to have been intended for a bed-place, and although its outer rim is a good deal broken

way in which the wall has been afterwards notched out shows that a second door was added after the completion of the excavation.

The persistent adherence of the architect to straight lines and sharp angles is very remarkable, notably at the inner entrance to chamber C, where so many corners seem quite unnecessary. Another noticeable feature of this complicated cave-system is the extreme difficulty of getting into it. The only entrance is by the neck of chamber C, through which, even in its present enlarged condition, a stout man could not pass. Moreover there is a step in the neck, and the step is undercut. A person in C, by simply pushing a large stone into the hole, could easily close the orifice beyond the power of anything but dynamite to open it from the side of B, and probably this was the intention of the device. But why communication between C and D should not have been effected by means of a doorway in the partition, instead of by clambering round the face of the rock, a transit, by the way, only practicable for grown-up people, is not so intelligible. It may fairly be assumed that C was not designed for habitation, since it is unprovided with doorposts; it was therefore merely a kind of entrance lobby. Perhaps this labyrinthine arrangement was a precaution against surprise. An enemy, or a robber, feeling his way by means of the handholes from C to D, would be helplessly at the mercy of a sentinel posted in G, and the same disposition admirably protects the mouths of the chambers from escalade from below.

Whatever may be the secret of these singular excavations, the key to the mystery lies in the entrance lobby C. The want of parallelism in its walls is exceptional, and it should be noticed that the obliquity of its northern wall causes the difficulty of access to G.

This particular cave contains no seats, but in others which I explored I found bed-places arranged so as to form low and very comfortable settees. The edge of the bedsteads, i. e. the corner which would bear against the back of the knees of a person sitting on them, is rounded —not merely smoothed away, but boldly cut into a liberal curve; while the rear part of the seat falls as it retreats, the whole appurtenance exactly resembling a soft divan with a luxurious spring cushion. This similarity is so striking that I almost unconsciously looked for the feet. Absurd as the hallucination may have been, its justification was undeniable, for the feet are there! The upholsterer has undercut the rock, leaving feet *in situ*.

Enough has been said to show that the excavators were no rude happy-go-lucky borers. A higher idea of their art—I use the word advisedly—is gathered from an examination of the façade. Standing on the ground outside, and fifteen feet or so below, the mouths of the parallel chambers, one sees that the rock has been cut away into a smooth face, leaving the overhanging cliff to act as eaves; and this must evidently have been done before the perforation of the chambers was begun. Several feet above the line of openings a curious ornament

as possible hit the bulls-eye of a corresponding handhole in the wall of chamber D. It was a pleasant excursion, though an infinitesimally short one, which thus landed me in the main compartment of the cavern.

A passage 12 feet long between walls furnished with projections running from floor to roof, the purpose of which arrangement is not at first apparent, leads past a second fire-place and crockery shelf into a large chamber some six feet high. Two chambers have here been broken into one, much of the partition wall still remaining, but it is not easy to decide, from a mere inspection of the breach, whether there has originally been a door between the two, or whether the neighbours communicated with one another by getting in and out of the windows, so to speak. There must however have been some opening, otherwise the smoke of their fire would have stifled the inmates of D. At any rate the chambers differ in plan, and each has its own passage differing in detail as regards the projections on the walls. Chamber E, again, is slightly longer than D, as a glance at the plan will show. Chamber F, runs much further back than the other two, and opens to the external air by a very long passage. Here again the partition is broken away. Chamber F contains a tank similar to the one first mentioned.

We have now visited five apartments, but there is still a sixth (G), somewhat higher in level, and only to be gained by a hazardous effort of squirming round the inside of the corner from C. When safely landed in it one observes that it commands the mouths of the four parallel chambers, and that its inner end, originally terminating in solid rock, has been broken through, probably during the process of cutting the modern high road which runs immediately below.

The purpose of the projections on the passage walls seems clear enough on the plan, but it is not so evident while one is scrambling about the interior. They can hardly be anything else than doorposts; if there be any doubt it is disposed of by the existence of holes through their edges for the insertion of strings to act as hinges or fastenings. But then the question occurs why should each of the three passages have had two doors, as appears from the plan? To this I reply by another question, why should there be any separate chambers at all, when it would have been so much easier roughly to hew out one large cavern than to take the minute and elaborate pains necessitated by so much subdivision? I imagine that the families who had their dwelling in the rock were respectable folk and loved privacy. By closing both doors each chamber with its passage would form two separate bedrooms. The space between the doors is about the right length for a comfortable bed, leaving room for the sleeper's clothes at one end, and it will be observed that in passage F, the space between the doors remains much the same length as in D and E, although its whole position lies several feet further inwards. Chamber D seems originally to have had only one door. The

uninjured show an even surface, retaining no marks of the tool; this is so noticeable that the flat faces do not look like sandstone, but appear almost as if they had undergone some hardening process. The wall-spaces are divided into compartments, some of which may have been

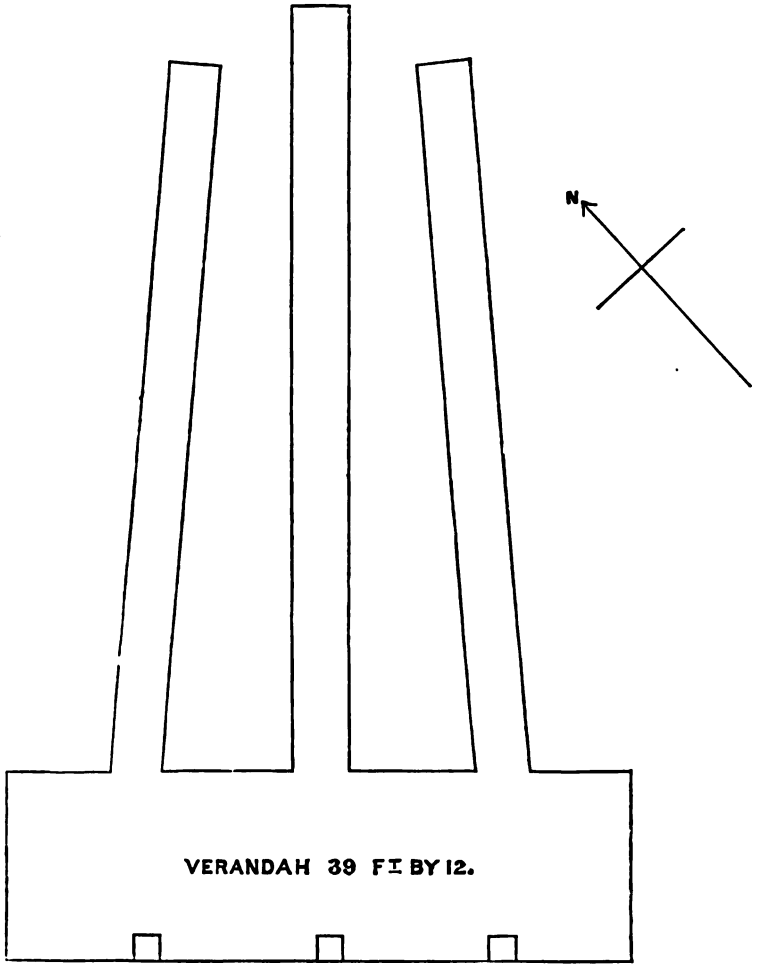



FIG. 10. Scale 12 feet to 1 inch.

sculptured in relief, and others perhaps have formed hollows for the reception of carved panels, but they are dilapidated beyond all possibility of deciding this point.

Very soon I discovered the disc-and-label pattern running along the upper part of the inner wall of the verandah in a condition of almost perfect preservation, and showing the same appearance of comparative hardness observable in other places. The pattern is here most exactly

and precisely carved, and although such an ornament may not seem highly decorative, it accords admirably with the solid and severe dignity of the cavern. One cannot keep one's eyes from it; and soon a certain irregularity is detected, caused by the labels not being synchronous, so to speak, with the discs, although the distances between individuals are regularly maintained in each row. Every fifth label, however, regains vertical coincidence with a disc. Thus, supposing Nos. 1, 2, 3, 4, 5, to represent a series of equidistant labels, and No. 1 to coincide with a disc, No. 5 will be the next to coincide. Fig. 11 is a sketch of the pattern. It did not occur to me to observe how many discs correspond to five labels, but judging from my original sketch the number would be fourteen, in which case thirteen spaces in the upper row are equivalent to four spaces in the lower one. Now it is curious that the length of the verandah compared with its breadth exhibits this same ratio of thirteen to four.

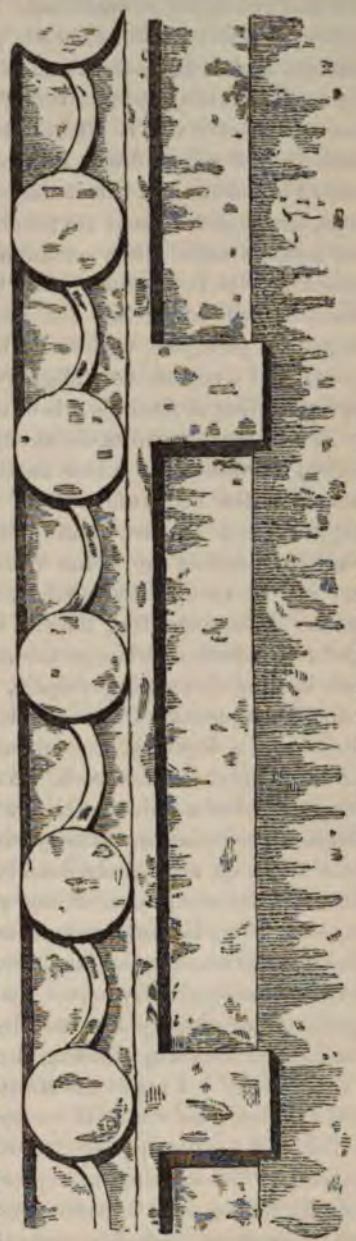


Fig. 11. Each disc about 5 inches in diameter.

The best conjecture I have to offer respecting the origin of this decoration is that it represents a highly conventionalised row of eaves, the discs being the ends of rafters, the festoons indicating the tiles, and the labels the ends of beams. But other carvings which adorn the cavern will not admit of being explained as survivals. The whole design of the verandah and its details is planned with perfect regularity and symmetry except in one striking particular. Between the doorways of the middle and western chambers—but not centrally between them—the trident symbol recurs; but unlike the example first mentioned, its three prongs spring out into several flamboyant branches. There is no carving on the

corresponding space between the central and eastern doorways. On the outside face of the pillars again the same theme is repeated, but with a different rendering in each case. Above the pillars a frieze covered with various details in relief exhibits personages seated upon unrecognisable animals, and at its eastern end is an object the meaning of which altogether defies conjecture, although its preservation is good. I scarcely know to what it can be likened, but it may be distantly compared to the press full of pigeon-holes in which the railway-clerk who takes fares keeps his tickets. In this instance the pigeon-holes are of various dimensions, and some of them are much fuller of tickets than others. I could not make a satisfactory examination of it, owing to the physical pain caused by its inspection. Any one who has suffered from exhibition headache will appreciate the sensation brought on by standing on the verge of a precipice, with one's back to it, and gazing almost vertically upwards at a surface very slightly inclined to the direction of sight. The representation of the object is of considerable size, perhaps five feet high.

A still more remarkable, though not more artistic excavation is that which, for want of a better name, may be called the King's Monument, carved in the body and face of a cliff on the left bank of the Min half way between Tao-ssu-kuan and Mo-tzŭ-ch'ang. It is known in the neighbourhood as the "Man Wang Tung"—Cave of the Mantzŭ King—and will be easily discovered by any one who inquires for it under that name. After ascending the cliff by a steep path the explorer walks along the brink which overhangs the monument until he sees a much steeper path leading down the precipice. Scrambling down the best way he can—there are plenty of weeds to hold on by—he comes after a few yards' progress to a doorway, the entrance to a flight of stairs which plunge into the heart of the rock. At the foot of these is a second flight forming in fact a pair of stairs, which lands him again on the face of the cliff in a small recess profusely carved with defaced and timeworn images, some of which are nearly detached, while others, possibly representing Buddhas, are sculptured in low relief on the sandstone wall. The most imposing effigy is a battered statue, 12 feet or more in height, the face of which is flattened away and pierced with deeply-cut square holes, presenting a most ghastly aspect, and really impressing a momentary horror upon a mind already troubled by the slippery descent and the sudden unexpected stairway leading down to the unknown. Now the word "Man-Wang"—King of the Mantzŭ—is loosely pronounced "Ma Wang," and a native who was with me insisted that the latter is the correct form and should be interpreted "The Pitted King," the evident intention of the square holes being to represent a severe case of small-pox. Unhappily for his most ingenious theory, this statue is not that of the king, and it is more probable that the holes were bored by the original sculptor for convenience in affixing a plaster mask which has been subsequently washed or worn away.

All the carvings in this recess are more or less unrecognisably mutilated. The floor is a mere ledge, without any parapet to save one from the precipice; but a levelled way leads a few yards along the face of the bluff into a kind of closet, wholly excavated in the sandstone, and overlooking the river by a window neatly cut through its thin outer wall. Beyond this is another ledge with a levelled floor about six feet wide, and here the explorer finds himself in full presence of the king.

His Majesty is represented by a very successful statue almost detached from the rock, and about as large again as life, seated on a bench in an easy and not ungraceful posture with one foot crossed upon the opposite knee and a hand laid upon the ankle, the body inclined slightly to the left and the face turned still more in the same direction. Although the work is not very delicate, it cannot be called rude. The sitter has an air of simple and unpretending affability, immensely differing from the "stuck-up" deportment of Chinese potentates as rendered by native sculptors; none but a born artist would have dared to portray an Oriental magnate in such unaffected guise. I should not even have observed the dress, but for a remark of my servant who noticed that the closely fitting coat was more like my frock-coat than a Chinese robe. The garment reaches to about mid-thigh, or a little lower, and very loose trowsers almost cover the shoes. The work is in fair preservation, and even much of the colouring has survived.

Perhaps the king's image is of later date than the other effigies. The people of the neighbourhood seem to take no interest in their conservation, but the approach to the grot is so secluded that they run little risk of gratuitous assault. No immediately local tradition, so far as I could learn, is attached to them. A Chinaman is always delighted to afford the fullest information about matters of which he is totally ignorant, but when he has remarked that the principal statue represents a Mantzŭ king, and inferred that it was carved by the Mantzŭ, he considers the subject exhausted. Whether the Mantzŭ—the aboriginal inhabitants of Western Ssŭ-ch'uan—were exterminated, absorbed, or exiled, is a question which historical research must solve; a stray traveller cannot expect, or be expected, to decide it. Mr. Alexander Wylie was the first to draw attention to these caves, and Baron von Richthofen makes allusion to them; but the proposed identification of their architects with the modern "Sifan," the twelve tribes who people the valley of the Upper T'ung, can hardly be more than a hopeful conjecture.

The Lolo chief who spent a few days with me under the precipices of Wa Shan professed to be acquainted with the Man Wang cave, and assured me that the statue portrays a certain Hsi-po, an ancient Lolo king—date unknown—of four powerful tribes, called Lin, Lung, Ma, and Wan, whose territory extended from Yueh-hsi to Chia-ting. It may be that Hsi-po is the same as the deity Shua-hsi-po, mentioned above; at any rate the Lolos worship Hsi-po, and burn as incense to him the

fragrant twigs of a dwarf fir which grows only on the loftiest summits. When speaking Chinese the Lolos call him Ma Wang—the Horse-king. "When we begin any enterprise," said the chief, "we invoke his name, much in the same way as the Chinese call upon Omito Fo. He is called the Horse-king because he could ride 500 *li* (100 miles) in the time it would take to cook a fowl (half an hour). The Chinese killed him, and ate his heart." Very likely this legend contains a grain of truth which more direct light may illumine.

The three caverns above described are the most elaborate I have seen, and the only examples I have gone many yards out of my way to visit. Hundreds, probably a great many hundreds, of a less artistic category exist, square or oblong chambers of five to eight feet, and some six feet high, entered by a doorway a yard or more square, which is cut into jambs on all four sides as if for the insertion of door-slabs, to close the opening. No trace however remains of such slabs. These are the most frequent, and are often excavated side by side, half a dozen together, in a convenient cliff, an arrangement which shows a certain resemblance to that of the ancient tombs at the temple of Pai-fo-ssŭ, mentioned above. Some of them, indeed not a few, are drilled high up in the face of a bluff, and impossible of approach; but in general their embrasures are level with the soil, or even beneath it in places where earth and fragments of rock have fallen from above and raised the surface. I have seen one instance, on the right bank of the Min above Chia-ting, where no less than twelve portholes, apparently entering upon caves of this character, are arranged with almost geometrical precision in three tiers, one above the other, and very close together. There is probably an internal communication between them, but they are too far aloft to be scaled without the aid of longer ladders than the Chinese employ. Caves of this kind, in one irregular tier, are common near Ch'ung-ch'ing, and some single specimens are met with even in the city. A case has occurred within my knowledge of a citizen digging in his garden at the foot of a low rock and coming, at four or five feet beneath the surface, upon the entrance of a cave which, however, contained no remains and, like all the rest, was unprovided with a door. A trustworthy observer informs me of an example near Ch'i-chiang Hsien, about 50 miles south of Ch'ung-ch'ing, which has been carved in a loose boulder of sandstone; in process of time the boulder has been upset, probably by a flood, in such a manner that the doorway now lies uppermost, like the mouth of a pit.

Another kind consists of a short gallery containing the settee above described, and sometimes a tank. There are many varieties of this species which it would be tedious to describe: enough has been said to show the interest and extent of the subject and to promise a rich reward to the patient explorer.

Two or three leading facts may be regarded as fairly established.

The caves are always situated near running water; but they do not occur, curiously enough, on the Yangtzŭ. Even if I had not failed to find them along the banks of that river, Captain Blakiston's silence on the subject would be almost conclusive. Again, none of them contain inscriptions. Brown, Jones, and Robinson, have indeed incised their signs-manual and recorded their *impressions de voyage* in the free and accepted manner of tourists, whether Chinese or cockney; but the style of such impromptus is easily recognised. If the caverns had been designed by Chinese architects, every instance would have exhibited a prominent and symmetrical inscription; the absence of anything of the kind is a proof that the constructors were not Chinese, and seems to indicate that they were not Buddhists, still they may have been early Buddhists. The ante-chapel leading to the King's Monument is carved, as already remarked, with small bas-reliefs very much worn down, which look like presentments of Buddha, and moreover colossal rock-statues are here and there met with in the cave country. One such, about 200 feet high, purports to be carved in the cliff opposite Chia-ting, but I failed to discover any trace of the sculptor's hand except in the face, which is roughly rounded from a projecting rock, and furnished with a plaster nose six or eight feet long. A more genuine colossus is found two days' journey east of Chia-ting, where, as a Russian traveller informs me, a hill has been hewn into a seated image of Buddha "several hundred feet high, which far overtops the roofs of the surrounding temples."

The last point worthy of remark is that while the Ssŭ-ch'uan caves are pierced in sandstone bluffs, the Lolo and Sifans inhabit a region of hard limestone in which such extensive perforations are impossible. It will consequently be hopeless to look in their countries for modern examples of such works with a view of supporting the theory that either of them are the descendants and representatives of the ancient Mantzŭ.

A persistent and plodding exploration of these interesting monuments will have to precede the formation of any trustworthy opinion respecting their design and their designers. The caves are of many kinds, and may have served many uses. They may have been tombs, houses, granaries, places of refuge, easily defended storehouses, shrines, memorials, and even sentry-boxes, according to their disposition and situation. The local Chinaman, a person of few thoughts, and fewer doubts, protests that they are the caves of the Mantzŭ, and considers all further inquiry ridiculous and fatiguing. His archæological speculations have not been greatly overstepped by my own theory, which I offer with diffidence, that these excavations are of unknown date, and have been undertaken, for unexplained purposes, by a people of doubtful identity.

Previous to the reading of the above paper,

The PRESIDENT said that he believed Sir Rutherford Alcock, their former President, was the author of the plan for the improvement of foreign diplomatic

service in China, the good results of which were now being reaped. Sir Rutherford persuaded the Government to establish in that country a school for the education of promising young men in the Chinese language, as well as in other necessary diplomatic information. Among these students Mr. Baber was one of the most distinguished. He acquired a remarkable knowledge of the Chinese language, and was chosen to accompany Mr. Grosvenor in a journey which extended across the whole of the southern portion of China, when the inquiry was made into the manner by which the unfortunate and gallant officer, Mr. Margary, met his death. Subsequently, he was appointed a consul at the principal town of West Ssŭ-chuan, and it was in the remoter portions of that province that the explorations were conducted which were described in the paper. In the absence of Mr. Baber, the paper would be read by Captain Gill, who had himself received the gold medal of the Society for his extensive and accurate explorations in China, the results of which had been given in one of the most valuable works upon Chinese travels which had ever issued from the press. Captain Gill was the personal friend of Mr. Baber, and travelled for three months with him up the great river through which the heart of China is entered. At the same time, the particular part of China about to be described has been visited only by Mr. Baber. It was commonly thought that in these days voyages of discovery were made rather to enlarge existing knowledge than to find new regions or new people, but Mr. Baber had visited an absolutely new country, and had been fortunate enough to come across a people of whose existence, race, and character, hitherto nothing at all had been known.

After the paper,

Sir Rutherford Alcock said the Society was very fortunate in having received a paper so full of original matter, and of such great scientific value as that of Mr. Baber. They were also fortunate in having (in the absence of the able writer) such a distinguished Chinese traveller as Captain Gill to read it. No one who was acquainted with Mr. Baber would fail to value not only his powers of mind, but his originality. His paper manifested a sense of humour in the narrative of his careful observations. He (Sir Rutherford) was glad to know that the paper had been written by a gentleman who first made his appearance in China while he was Minister at Pekin. Mr. Baber had previously distinguished himself at Cambridge, and had fully justified the hopes that were formed as to his future career. His discovery of what appeared to be a new language, and of a new people never before visited by any European, not even by Marco Polo, was a feat that could be reserved for very few in the present age of the world.

M. Terrien de LaCouperie said: Je suis très-honoré et ne saurais trop remercier le Président de son très gracieux appel à mes études spéciales à propos de l'une des plus importantes contributions qui aient été depuis longtemps fournies à l'ethnologie et à la linguistique de l'extrême-Orient. Je ne saurais jusqu'à présent dire que peu de chose du MS. Lolo envoyé par Mr. Colborne Baber. J'en ai eu communication grâce à l'amitié du Capitaine Gill, mais sans avoir eu aucune connaissance des nombreuses et valables informations contenues dans le rapport qui vient de vous être soumis. La copie xylographiée que j'ai examinée comprend sur huit feuillets 1800 mots dont 450 différents, en plusieurs textes qui ne sont pas tous de la même main et me semblent traiter de matières variées. Un mot est répété plus de cent fois, quelques uns une cinquantaine, un plus grand nombre de vingt à trente et ainsi de suite progressivement; le plus grand nombre est celui des exemples uniques. L'écriture est phonétique composée d'un petit nombre de caractères, moins de quarante; elle est alphabétique, les lettres se combinent en groupes. Le fait le plus remarquable à signaler et qui au premier moment causera quelques surprises à cause des théories prématurées est son extrême ressemblance avec quelques écritures

du grand archipel d'Asie. Son affinité est remarquable avec les écritures des Lampung et des Redjang de Sumatra auxquelles se rattachent celles des Battaks, Bugis et Mankassars, et probablement plusieurs autres plus à l'est. Si l'on veut bien se rappeler que l'anthropologie nous a signalé depuis quelques années l'existence et l'extension ancienne vers le sud de la race au type dit Caucasique à laquelle appartiennent les Lolos, on sera moins étonné de ce fait. Mais là ne s'arrêtent pas les affinités de cette écriture remarquable. Le Major Clarke, dans ses fouilles à Harapa dans le Pendjâb, a trouvé il y a quelques années un sceau en pierre qui a été publié par le Général A. Cunningham dans un des 'Reports of the Archæological Survey of India,' et ensuite dans son 'Corpus Inscriptionum Indicarum.' Or, la légende de ce sceau est en caractères pareils à ceux des Lolo, du MS. Baber. Et le savant archéologue lui attribue une antiquité de quatre à cinq siècles avant notre ère. D'un autre côté, je me permettrai de rappeler que j'ai signalé à la Royal Asiatic Society, l'affinité de l'alphabet Coréen et d'un ancien alphabet du Japon avec l'écriture Indo-Pâli d'Açoka, affinité qui est à considérer, comme le prouvent certaines formes archaïques des caractères, non comme une dérivation, mais comme un parallélisme par suite d'une origine commune. Enfin, l'écriture des Lolos offre les ressemblances les plus remarquables avec cette écriture d'Açoka, la plus ancienne connue de l'Inde; mais ces ressemblances ne sont pas le résultat d'une filiation directe de l'une à l'autre. Leur ensemble conduit à considérer l'écriture des Lolos comme faisant partie d'une famille d'écritures plus ou moins perfectionnées ultérieurement, dont nous trouvons l'origine, par la même série d'affinités, dans l'emploi phonétique d'un certain nombre de caractères chinois avec leurs prononciations de l'ouest de la Chine, emploi fait par les états frontières, selon toute probabilité, pour faciliter leurs relations commerciales. Les caractères Chinois auxquels ces écritures comparées nous conduisent en dernier ressort, appartiennent à l'écriture progressivement réduite qui était en usage en Chine quelques siècles avant notre ère et qui fut officiellement abandonnée en 211 av. n. è. Nous en trouvons de nombreux exemples non seulement sur les inscriptions mais encore sur les monnaies de l'époque. Il est une autre écriture des aborigènes de la Chine dont je suis heureux de pouvoir dire ici quelques mots, parceque son étrangeté nous est expliquée en partie par l'écriture des Lolos, dont elle parait être une variété fort grossière. C'est celle des Na-shi ou Mossos, qui n'existe plus qu'entre les mains des *tomba* ou sorciers et dont le P. Desgodins, le missionnaire au Tibet bien-connu, a pu prendre une copie qu'il a envoyée à sa famille en France, et dont je dois la communication à l'obligeance de M. Girard de Rialle. Cette écriture, outre un grand nombre de signes et de combinaisons comme celle des Lolo et d'anciens caractères Chinois? contient une masse de figures mythologiques, divinités, animaux, caractères bouddhiques, &c. Le British Museum est redevable au Capitaine Gill d'un très-beau MS. Na-shi, qu'il a eu l'heureuse chance de se procurer en passant à proximité de leur pays, pendant son remarquable voyage. Le Capitaine Gill, comme Mr. Colborne Baber, a droit à la reconnaissance des orientalistes. Mais tout ceci demande à être exposé dans un mémoire scientifique avec l'ensemble des preuves discutées au menu; ce qui ne saurait être fait dans une simple communication verbale déjà trop longue et dont je vous prie de m'excuser.*

The PRESIDENT, in proposing a vote of thanks to Captain Gill, said the paper was

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* Since the above was spoken, I have been able, by the kindness of Mr. Bates, to avail myself of the two other documents of Lolo writing sent by Mr. Baber; viz. the bilingual page and the list of twenty-one words. The result of this further inquiry is that I have nothing to modify in the foregoing statements, and that the Lolo writing is undoubtedly phonetic, and presents the most remarkable affinities with the writings of Sumatra to which I have referred.—T. de L.

sent by Mr. Baber to that gentleman with a request that he would forward it to the Royal Geographical Society. Captain Gill did as he was requested, but the value of the paper was only beginning to be ascertained when the Society received a notice from the Foreign Office saying that it ought not to have been forwarded to the Society, but should have been communicated to the Foreign Office. It had been sufficiently examined to show that it was entirely of geographical and in no respect of political interest, but of course the Society could not refuse to surrender it as it had been sent by an official connected with the Foreign Office. At the same time representations were made to the Foreign Office, and a hope was expressed that it might be returned to the Society. Hardly twenty-four hours before the meeting a letter was received from the Foreign Office requesting that the Society would furnish them with a printed copy of the paper in order that it might be placed in the archives. Captain Gill had, therefore, had the very difficult task of making selections from it at very short notice, but the specimens that had been read showed that Mr. Baber was not only a man who could think, but one who was able to express his thoughts in the most felicitous manner. At the same time it was impossible by a few extracts to convey to any audience an idea of the amount of minute and valuable information contained in the paper, which included several sheets of observations most carefully taken. The author had acquainted himself with all the knowledge required by the traveller who desired to obtain accurate information. His observations and his admirably made charts rendered the paper one of unusual and extraordinary interest, quite apart from the fact that the region discovered was inhabited by so singular a people as the Lolos appeared to be. The paper would shortly be published, and would justify the eulogiums passed upon it by all those who had had an opportunity of reading it.

# APPENDICES.

## APPENDIX A.

### Corrected Readings of Temperature and Atmospheric Pressure at Ch'ung-Ch'ing.

The station is a house in the street known as Chiang-chia-hang, 225 feet above the level of the Yang-tzŭ, in latitude 29° 34′ N. and longitude 106° 50′ E.

The annexed table gives the monthly means of temperatures recorded three times a day at the hours indicated.

Temperature.

| | 1877. | | | 1878. | | | 1879. | | | 1880. | | | Mean. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. |
| Jan. | .. | .. | .. | 42·6 | .. | 44·8 | 46·3 | 49·5 | 48·0 | 44·6 | 47·6 | 46·7 | 44·5 | 48·5 | 47·3 |
| Feb. | .. | .. | .. | .. | .. | .. | 49·6 | 53·5 | 51·8 | 47·5 | 50·1 | 48·7 | 48·5 | 51·8 | 50·2 |
| Mar. | .. | .. | .. | .. | .. | .. | 52·2 | 55·9 | 55 0 | 57·2 | 63·5 | 60·6 | 54·6 | 59·7 | 57·8 |
| April | 66·1 | 71·9 | 66·6 | .. | .. | .. | 65·0 | 70·5 | 67·4 | 63·5 | 69·6 | 65·5 | 64·9 | 70·7 | 66·5 |
| May | 70·0 | 74·2 | 72·0 | .. | .. | .. | 69·4 | 77·0 | 74·5 | 71·0 | 76·6 | 73·4 | 70·1 | 75·9 | 73·3 |
| June | 76·4 | 82·2 | 78·6 | .. | .. | .. | 75·7 | 81·0 | 78·1 | 74·1 | 78·6 | 75·7 | 75·4 | 80·6 | 77·5 |
| July | .. | .. | .. | 79·1 | 84·0 | 80·6 | 82·7 | 88·3 | 84·9 | 80·2 | 85·7 | 82·5 | 80·7 | 86·0 | 81·5 |
| Aug. | .. | .. | .. | 82·1 | 87·9 | 85·0 | 83·2 | 90·2 | 86·0 | .. | .. | .. | 82·6 | 89·0 | 85·5 |
| Sept. | .. | .. | .. | 77·4 | 83·8 | 78·1 | 77·0 | 82·5 | 78·6 | 76·3 | 83·6 | 79·6 | 76·9 | 83·3 | 78·8 |
| Oct. | .. | .. | .. | 65·2 | 68·1 | 66·8 | 64·3 | 66·6 | 65·3 | 66·5 | 70·1 | 68·0 | 65·3 | 68·3 | 66·7 |
| Nov. | .. | .. | .. | 57·7 | 60·9 | 59·0 | 57·6 | 60·9 | 59·4 | .. | .. | .. | 57·7 | 60·9 | 59·2 |
| Dec. | 49·9 | .. | 51·5 | 49·9 | 52·9 | 51·6 | 49·7 | 52·9 | 51·5 | .. | .. | .. | 49·8 | 52·9 | 51·5 |
| | | | | | | | | | | | Mean | .. | 64·2 | 69·0 | 66·3 |

The pressures shown in the following table were read from aneroid barometers, whose index error was frequently tested by comparison with boiling-point thermometers (with Kew corrections).

Pressure.

| | 1877. | | | 1878. | | | 1879. | | | 1880. | | | Mean. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. | 9 A.M. | 3 P.M. | 9 P.M. |
| Jan .. | .. | .. | .. | .. | .. | .. | 29·49 | 29·34 | 29·42 | 29·48 | 29·33 | 29·42 | 29·485 | 29·335 | 29·420 |
| Feb. .. | .. | .. | .. | .. | .. | .. | 29·35 | 29·21 | 29·29 | 29·35 | 29·23 | 29·33 | 29·350 | 29·220 | 29·310 |
| March .. | .. | .. | .. | .. | .. | .. | 29·29 | 29·17 | 29·24 | 29·30 | 29·17 | 29·23 | 29·295 | 29·170 | 29·235 |
| April .. | 29·22 | 29·13 | 29·18 | .. | .. | .. | 29·13 | 29·00 | 29 08 | 29·20 | 29·06 | 29·16 | 29·183 | 29·060 | 29·140 |
| May .. | 28·97 | 28·86 | 28·93 | .. | .. | .. | 29·01 | 28·89 | 28·92 | 29·04 | 28·95 | 29·00 | 29·007 | 28·900 | 28·950 |
| June .. | 28·87 | 28·78 | 28·84 | .. | .. | .. | 28·91 | 28·81 | 28·89 | 29·00 | 28·93 | 28·98 | 28·927 | 28·840 | 28·903 |
| July .. | .. | .. | .. | .. | .. | .. | 28·85 | 28·77 | 28·83 | 28·89 | 28·81 | 28·87 | 28·870 | 28·790 | 28·850 |
| August | .. | .. | .. | .. | .. | .. | 28·97 | 28·86 | 28·93 | .. | .. | .. | 28·970 | 28·860 | 28·930 |
| Sept. .. | .. | .. | .. | .. | .. | .. | 29·11 | 28·99 | 29·09 | 29·19 | 29·06 | 29·14 | 29·150 | 29·025 | 29·115 |
| Oct. .. | .. | .. | .. | 29·36 | 29·28 | 29·33 | 29·35 | 29·25 | 29·32 | 29·41 | 29·31 | 29·37 | 29·373 | 29·280 | 29·340 |
| Nov. .. | .. | .. | .. | 29·55 | 29·42 | 29·50 | 29·39 | 29·26 | 29·33 | .. | .. | .. | 29·470 | 29·340 | 29·415 |
| Dec. .. | .. | .. | .. | 29·52 | 29·38 | 29·44 | 29·40 | 29·27 | 29·34 | .. | .. | .. | 29·460 | 29·325 | 29·390 |
| | | | | | | | | | | | Mean | .. | 29·212 | 29·095 | 29·166 |

A comparison of these readings with data supplied in Dr. Fritsche's 'Climate of Eastern Asia' places the station at 845 feet above sea-level.

The above means have been employed in calculating the altitudes in the next Appendix, i. e. Ch'ung-ch'ing has been taken as the *Lower Station* and 845 feet added to all results.

# APPENDIX B.

## Calculation of Altitudes.

Although I carried no hypsometrical apparatus by which to test aneroid readings, my lines of route cross very happily altitudes previously determined by Captain Gill, and I am thereby enabled to deduce the requisite corrections and to obtain fairly trustworthy results. The first stations of comparison occur a little beyond Ya-chou the contrast between Captain Gill's record and my uncorrected readings was as follows:—

| Station. | Date of Mr. Baber's visit. | Mr. Baber's Uncorrected Readings. | Date of Captain Gill's Visit. | Captain Gill's Corrected Mean Pressure. |
|---|---|---|---|---|
| Kuan-yin-p'u .. .. .. | Aug. 10, 7 A.M. | 26·51 | July 15 | 27·17 |
| Yung-ching Hsien .. .. | „ „ 9 P.M. | 26·68 | „ 16 | 27·35 |
| Huang-ni-p'u .. .. .. | „ 11, 9 „ | 25·37 | „ 17 | 26·03 |
| Ta Hsiang-ling .. .. | „ 12, 7 „ | 20·77 | „ 18 | 21·30 |
| Ch'ing-ch'i Hsien .. .. | „ 13, 9 „ | 23·72 | „ „ | 24·48 |

Allowing for the difference of date the comparison shows an index error of 0·77 + which I have accordingly applied to all subsequent readings.

| No. | Date. | Place. | Corr. Bar. | Corr. Ther. | Bar. at L.S. | Ther. at L.S | Deduced Altitude | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | 1877 | | | | | | feet. | |
| 1 | Aug. 17, 4 P.M. | Fu-lin .. .. .. | 27·57 | 78 | 28·87 | 88 | 2175 | On Ta-tu river. |
| 2 | „ 18, noon | Pass S. of Ta-shu-pu | 25·23 | 75 | 28·92 | 86 | 4770 | |
| 3 | „ „ 9 P.M. | P'ing-i-p'u .. .. | 25·11 | 73 | 28·94 | 84 | 4910 | |
| 4 | „ 19, 3 „ | Pass above Hai-t'ang .. .. | 22·77 | 73 | 28·89 | 88 | 7700 | |
| 5 | „ 20, 7 A.M. | Hai-t'ang or Ning-yueh .. .. | 23·71 | 62 | 28·97 | 78 | 6490 | |
| 6 | „ 21, 8 „ | Liao-i-p'u .. .. | 24·27 | 62 | 28·98 | 80 | 5870 | |
| 7 | „ 22, 10 „ | Kuan-ting .. .. | 23·61 | 72 | 28·98 | 82 | 6720 | |
| 8 | „ „ 10 P.M. | Yueh-hsi T'ing .. | 24·72 | 72 | 28·96 | 82 | 5380 | |
| 9 | „ 23, 11 „ | Hsiao-shao .. .. | 23·81 | 67 | 28·97 | 81 | 6440 | |
| 10 | „ 24, 11 A.M. | Hsiao Hsiang-ling | 21·27 | 71 | 28·98 | 84 | 9710 | On summit. |
| 11 | „ „ 10 P.M. | Têng-hsiang-ying | 22·91 | 69 | 28·97 | 82 | 7550 | |
| 12 | „ 27, 7 A.M. | Lu-ku .. .. .. | 24·80 | 65 | 29·00 | 76 | 5290 | |
| 13 | „ 28, 6 „ | Li-chou .. .. | 24·94 | 66 | 28·98 | 74 | 5110 | |
| 14 | „ 30, 7 P.M. | Ning-yuan Fu .. | 24·99 | 76 | 28·99 | 83 | 5135 | |
| 15 | „ 31, 11 „ | Huang-lien-p'u .. | 25·21 | 70 | 29·00 | 80 | 4870 | |
| 16 | Sept. 1, 10 „ | Ma-li-chai .. .. | 25·22 | 69 | 29·00 | 80 | 4860 | |
| 17 | „ 2, 9 „ | Hsiao-kao-ch'iao | 25·67 | 72 | 29·01 | 81 | 4389 | |
| 18 | „ 3, 10 „ | T'ieh-hsiang-fang | 26·01 | 75 | 29·00 | 80 | 4000 | |
| 19 | „ 5, 7 A.M. | Tien-sha-kuan .. | 25·62 | 68 | 29·04 | 74 | 4430 | |
| 20 | „ 6, 7 „ | Mo-so-ying .. .. | 25·72 | 65 | 29·04 | 74 | 4300 | |
| 21 | „ 7, 7 „ | Pai-ko-wan .. .. | 23·82 | 58 | 29·04 | 74 | 6435 | |
| 22 | „ 9, noon | Hui-li Chou .. | 24·26 | 67 | 29·03 | 81 | 6000 | |
| 23 | „ 12, 6 A.M. | T'an-kuan-yao .. | 24·23 | 61 | 29·05 | 71 | 5980 | |
| 24 | „ 13, noon | Liu-shu-wan .. | 24·39 | 75 | 29·04 | 81 | 5895 | |
| 25 | „ 14, 7 A.M. | Near K'u-chu .. | 24·54 | 68 | 29·06 | 73 | 5650 | On river. |
| 26 | „ „ 3 P.M. | Summit of ridge | 22·07 | 72 | 29·00 | 83 | 8695 | |
| 27 | „ 15, 7 P.M. | Tu-ké .. .. .. | 22·83 | 58 | 29·06 | 80 | 7670 | |
| 28 | „ 16, 9 A.M. | Ché-po .. .. .. | 23·44 | 58 | 29·11 | 77 | 6965 | |
| 29 | „ 17, 8 „ | Ta T'au-kuan-yao | 24·92 | 63 | 29·10 | 75 | 5240 | |
| 30 | „ 18, noon | Near Wa-wu .. | 28·05 | 74 | 29·07 | 80 | 1900 | On Gold River. |

| No. | Date. | Place. | Corr. Bar. | Corr. Ther. | Bar. at L.S. | Ther. at L.S | Deduced Altitude | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | 1877 | | | | | | feet. | |
| 31 | Sept. 18, 8 P.M. | Ch'iao-chia T'ing | 27·41 | 70 | 29·10 | 77 | 2580 | |
| 32 | „ 19, 4 „ | Ridge on R. B. of Gold River .. | 21·98 | 72 | 29·02 | 82 | 8815 | |
| 33 | „ 20, noon | Ai-chuo .. .. | 22·68 | 71 | 29·10 | 79 | 7960 | |
| 34 | „ „ 7 P.M. | Mao-p'o .. .. | 23·47 | 63 | 29·11 | 78 | 6940 | |
| 35 | „ 22, 8 A.M. | Fa-ni-wo .. .. | 23·86 | 61 | 29·14 | 73 | 6470 | |
| 36 | „ „ 1 P.M. | Summit of pass .. | 22·03 | 50 | 29·10 | 79 | 8630 | |
| 37 | „ 24, 8 A.M. | Ta-p'ing .. .. | 24·55 | 56 | 29·17 | 73 | 5670 | |
| 38 | „ 25, 9 „ | Near Wei-ku .. | 27·25 | 63 | 29·18 | 74 | 2780 | On Niu-lan river. |
| 39 | „ 26, 9 „ | Shui-kou .. .. | 23·97 | 54 | 29·19 | 73 | 6340 | |
| 40 | „ 27, 9 „ | Hei-lu-ch'i .. .. | 23·12 | 48 | 29·20 | 73 | 7320 | |
| 41 | „ 28, 8 „ | Ku-chai .. .. | 23·42 | 52 | 29·19 | 72 | 6970 | |
| 42 | „ 29, 8 „ | Hsin-kai-tzŭ .. | 23·50 | 49 | 29·21 | 68 | 6835 | |
| 43 | „ 30, 8 „ | Yuan-chia-ta-ti .. | 23·28 | 49 | 29·21 | 68 | 7095 | |
| 44 | „ „ 10 „ | Pai-fa-ch'i .. .. | 21·97 | 47 | 29·23 | 73 | 8730 | |
| 45 | „ „ 3 P.M. | Highest point of Downs .. .. | 21·29 | 48 | 29·12 | 77 | 9540 | |
| 46 | Oct. 1, 7 A.M. | Yeh-chu-chai .. | 22·04 | 49 | 29·22 | 66 | 8600 | |
| 47 | „ 2, 10 „ | Kuan-chai .. .. | 21·97 | 49 | 29·25 | 72 | 8760 | |
| 48 | „ 4, 7 „ | Hsin-tien-tzŭ .. | 26·02 | 57 | 29·24 | 64 | 4060 | |
| 49 | „ 6, 9 „ | Near Huang-kuo-shu .. .. .. | 28·91 | 69 | 29·28 | 68 | 1200 | On Gold River. |
| 50 | „ „ 4 P.M. | Ya-k'ou .. .. | 25·07 | 70 | 29·15 | 71 | 5090 | |
| 51 | „ 8, 8 A.M. | Mi-t'ien-pa .. .. | 25·65 | 63 | 29·28 | 64 | 4525 | |
| 52 | „ „ noon | Ting-chiang-ao .. | 24·93 | 71 | 29·25 | 69 | 5340 | |
| 53 | „ 9, 7 A.M. | Ta-wu .. .. .. | 26·17 | 57 | 29·28 | 63 | 3945 | |
| 54 | „ 10, 7 „ | Lêng-fan-kou .. | 26·37 | 56 | 29·28 | 63 | 3735 | |
| 55 | „ 11, 7 „ | Ching-ti .. .. | 27·67 | 63 | 29·29 | 62 | 2425 | |
| 56 | „ 12, 8 „ | Kuo-ch'üan-t'an .. | 29·04 | 70 | 29·32 | 63 | 1115 | A few feet above Gold River. |
| 57 | „ 15, 7 „ | ¾ mile N. of Nan-mu-p'ing .. .. | 26·80 | 60 | 29·32 | 61 | 3330 | |
| 58 | „ 16, 7 „ | Chuo-pang-ai .. | 27·38 | 63 | 29·32 | 61 | 2745 | |
| | 1878 | | | | | | | |
| 59 | Mar. 16, 9 A.M., 3 P.M., 9 „ | Fu-lin .. .. .. | 27·87 | 55 | 29·22 | 58 | 2145 | In village (see Nos. 1 and 73). |
| 60 | „ 18, 9 A.M., 3 P.M., 9 „ | Ho-ch'ang-pa .. | 27·76 | 55 | 29·22 | 58 | 2250 | |
| 61 | „ 22, 9 A.M., 3 P.M., 9 „ | Tzŭ-ta-ti .. .. | 27·54 | 64 | 29·20 | 59 | 2465 | A few feet above Ta-tu river. |
| 62 | Apr. 19, 5 P.M. | Pass between T'ien-wan and Wan-tung .. | 23·32 | 71 | 29·04 | 70 | 7020 | |
| 63 | „ 21, 8 A.M. | Pass between Wan-tung and Mo-si-mien .. .. | 22·17 | 59 | 29·13 | 64 | 8410 | |
| 64 | „ 22, 8 „ | La-ma-ssŭ .. .. | 24·52 | 53 | 29·13 | 64 | 5590 | |
| 65 | „ 23, 8 „ | Ta-ch'iao .. .. | 22·27 | 39 | 29·12 | 64 | 8135 | |
| 66 | „ 24, 8 „ | Pass between Ta-ch'iao and Ta-chien-lu .. .. | 18·69 | 32 | 29·12 | 64 | 12820 | |
| 67 | May 7, 9 „, 9 P.M. | Ta-chien-lu .. | 22·03 | 56 | 29·00 | 70 | 8480 | Capt. Gill has 8346 |
| 68 | „ 20, 9 A.M., 9 P.M. | Lu-ting-ch'iao .. | 25·42 | 70 | 28·95 | 72 | 4515 | „ „ 4640 |
| 69 | „ 24, 8 A.M. | Hua-liu-p'ing .. | 23·19 | 61 | 28·97 | 69 | 7050 | „ „ 7073 |

| No. | Date. | Place. | Corr. Bar. | Corr. Ther. | Bar. at L.S. | Ther. at L.S | Deduced Altitude | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | 1878 | | | | | | feet. | |
| 70 | May 24, 10 A.M. | Fei-yueh-ling .. | 21·34 | 62 | 28·97 | 73 | 9410 | Capt. Gill has 9022 |
| 71 | „ 25, 8 „ | Ni-t'ou .. .. | 24·91 | 69 | 28·97 | 69 | 5090 | „ „ 4882 |
| 72 | „ 26, 8 „ | Fu-chuang .. .. | 26·09 | 73 | 28·96 | 69 | 3790 | „ „ 3873 |
| 73 | „ 30, 7 „ | Fu-lin .. .. .. | 27·34 | 71 | 28·95 | 67 | 2450 | In upper chamber of temple. Accept 2150 for level of river. |
| 74 | „ „ 3 P.M. | Ma-lie .. .. .. | 24·69 | 73 | 28·87 | 78 | 5290 | |
| 75 | „ „ 9 „ | Ma-lie-shao .. | 22·80 | 67 | 28·92 | 74 | 7540 | |
| 76 | June 1, 8 A.M. | Huang-mu-ch'ang | 23·93 | 58 | 28·95 | 71 | 6150 | |
| 77 | „ „ 4 P.M. | So-i-ling Pass .. | 21·74 | 55 | 28·86 | 79 | 8775 | |
| 78 | „ 2, 9 A.M. | Ta-t'ien-ch'ih .. | 24·10 | 63 | 28·95 | 73 | 5985 | |
| 79 | „ 5, 11 „ | Summit of Mt. Wa | 20·37 | 48 | 28·90 | 75 | 10545 | |
| 80 | „ 11, 7 „ | Chin-kou-ho .. | 28·04 | 71 | 28·90 | 71 | 1695 | |
| 81 | „ 12, 9 „ | Shui-tiao-lin .. | 26·24 | 68 | 28·93 | 75 | 3600 | |
| 82 | „ 13, 9 „ | Hsin-ch'ang .. | 27·12 | 66 | 28·93 | 75 | 2670 | |
| 83 | „ 17, 9 „ / 3 P.M. / 9 „ | Chia-ting Fu .. | 28·66 | 75 | 28·89 | 75 | 1070 | On river. |
| 84 | .. .. | Huang-mao-kang | 1670 ft. above Chia-ting Fu .. .. | | | | 2740 | |
| 85 | .. .. | Yü-lung .. .. | 2430 | „ | „ | | 3500 | |
| 86 | .. .. | Ts'ai-kou .. .. | 2560 | „ | „ | | 3630 | |
| 87 | .. .. | Omi Hsien .. .. | 400 | „ | „ | | 1470 | |
| 88 | .. .. | Mt. Omi .. .. | 9770 | „ | „ | | 10840 | |
| 89 | .. .. | Lung-ch'ih .. .. | 1660 | „ | „ | | 2720 | A few feet above lake. |
| 90 | .. .. | Lu-lu-p'ing .. | 2560 ft. above Chin-kou-ho .. .. | | | | 4255 | |
| 91 | .. .. | P'ing-shan Hsien | .. | | .. | | 1025 | |

The following levels, observed in 1876, are somewhat less trustworthy :—

| No. | Date. | Place. | Corr. Bar. | Corr. Ther. | Bar. at L.S. | Ther. at L.S | Deduced Altitude | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | 1876 | | | | | | | |
| 92 | Feb. 4, 3 P.M. | An-pien .. .. | 29·27 | 52 | 29·25 | 51 | 870 | Probably too low by 100 feet. |
| 93 | „ 9, 7 A.M. | Lao-wa-t'an .. | 29·00 | 41 | 29·32 | 45 | 1140 | |
| 94 | „ „ 1 P.M. | Summit of Li-shan .. .. | 26·18 | 46 | 29·28 | 50 | 3865 | |
| 95 | „ 10, 9 A.M. / 9 P.M. | Ch'i-li-p'u .. | 27·48 | 48 | 29·34 | 48 | 2610 | |
| 96 | „ 14, 8 A.M. | Ta-kuan Hsien | 26·35 | 42 | 29·34 | 47 | 3725 | |
| 97 | „ „ 1 P.M. | Yang-liu-shu .. | 25·86 | 48 | 29·27 | 51 | 4195 | |
| 98 | „ 15, 9 „ | Wu-chai .. .. | 24·22 | 39 | 29·31 | 49 | 5950 | |
| 99 | „ „ 1 „ | Ta-ngai-tung .. | 23·84 | 50 | 29·27 | 51 | 6410 | |
| 100 | „ 16, 9 A.M. | Wu-ma-hai .. | 23·48 | 38 | 29·35 | 48 | 6805 | |
| 101 | „ 17, 8 „ / 2 P.M. / 9 „ | Chao-t'ung Fu | 23·67 | 44 | 29·29 | 50 | 6585 | |
| 102 | „ 21, 9 „ | Lu-tien .. .. | 23·78 | 35 | 29·30 | 52 | 6420 | |
| 103 | „ 22, 3 „ | Ma-tsao-kou .. | 22·93 | 43 | 29·21 | 54 | 7380 | |

| No. | Date. | Place. | Corr. Bar. | Corr. Ther. | Bar. at L.S. | Ther. at L.S | Deduced Altitude | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | 1876 | | | | | | feet. | |
| 104 | Feb. 23, 8 A.M. | Chiang-ti .. | 25·78 | 42 | 29·32 | 48 | 4300 | 100 feet above Niu-lan R. |
| 105 | „ „ 1 P.M. | Ya-kou-t'ang .. | 23·60 | 61 | 29·27 | 52 | 6750 | |
| 106 | „ „ 9 „ | I-chê-hsün .. | 24·05 | 54 | 29·29 | 52 | 6220 | |
| 107 | „ 24, 3 „ | Shan-hu-shu .. | 22·98 | 44 | 29·21 | 54 | 7335 | |
| 108 | „ 25, 8 A.M. | Hung-shih-ngai | 23·84 | 31 | 29·31 | 49 | 6330 | |
| 109 | „ „ 9 P.M. | Tung-ch'uan Fu | 23·10 | 36 | 29·28 | 52 | 7190 | |
| 110 | „ 27, 3 „ | Ch'ê-lu-ching .. | 21·00 | 52 | 29·20 | 55 | (?)9000 | Beyond range of aneroid. |
| 111 | Mar. 1, 1 „ | Liu-shu-ho .. | 23·40 | 70 | 29·24 | 54 | 7020 | |
| 112 | „ „ 9 „ | Hsün-tien Chou | 23·84 | 58 | 29·28 | 53 | 6470 | |
| 113 | „ 2, 1 „ | Chiang-so .. | 23·72 | 69 | 29·24 | 55 | 6650 | |
| 114 | „ „ 9 „ | I-lung .. .. | 23·33 | 54 | 29·27 | 54 | 7040 | |
| 115 | „ 4, 8 A.M. | Yang-lin .. .. | 23·71 | 56 | 29·30 | 50 | 6610 | |
| 116 | „ 5, 1 P.M. | Fên-shui-ling .. | 23·22 | 63 | 29·23 | 55 | 7190 | |
| 117 | „ 17, 7 A.M. 9 P.M. | Yun-nan Fu .. | 23·78 | 51 | 29·25 | 55 | 6490 | |

# APPENDIX C.

## Latitudes of Positions.

| No. | Station. | Object Observed. | Deduced Latitude. | | | Mean or corrected Latitude. | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | ° | ′ | ″ | ° | ′ | ″ | |
| 1 | P'ing-shan Hsien .. | Star N. | 28 | 39 | 6 | | | | |
| 2 | ,, .. | Sun | 28 | 39 | 8 | 28 | 39 | 7 | On river bank at east end of city. |
| 3 | Yen-tzŭ-ngai .. .. | Sun | 28 | 24 | 0 | 28 | 23 | 49 | |
| 4 | T'an-t'ou .. .. .. | Star S. | 28 | 19 | 49 | 28 | 19 | 38 | |
| 5 | Lin-chiang-ch'i .. | Sun | 28 | 9 | 23 | 28 | 9 | 12 | |
| 6 | Summit of Li-shan .. | Sun | 28 | 3 | 21 | 28 | 3 | 10 | |
| 7 | Ta-ngai-tung .. .. | Sun | 27 | 31 | 29 | 27 | 31 | 18 | |
| 8 | Cha-shang .. .. | Sun | 27 | 25 | 23 | 27 | 25 | 12 | |
| 9 | Chao-t'ung Fu .. | Star S. | 27 | 20 | 42 | | .. | | Examination Hall. |
| 10 | ,, .. | Sun | 27 | 20 | 29 | | | | |
| 11 | ,, .. | Star S. | 27 | 20 | 41 | | | | |
| 12 | ,, .. | Star S. | 27 | 20 | 49 | | | | |
| 13 | ,, .. | Sun | 27 | 20 | 43 | 27 | 20 | 30 | |
| 14 | Cha-la-hsün .. .. | Sun | 27 | 16 | 31 | 27 | 16 | 20 | |
| 15 | Chiang-ti .. .. .. | Star S. | 27 | 0 | 1 | | | | |
| 16 | ,, .. .. | Star N. | 26 | 59 | 39 | 26 | 59 | 50 | |
| 17 | Ya-kou-t'ang .. .. | Sun | 26 | 54 | 52 | 26 | 54 | 41 | |
| 18 | I-chê-hsün .. .. | Star S. | 26 | 49 | 30 | 26 | 49 | 19 | |
| 19 | Shan-hu-shu .. .. | Sun | 26 | 42 | 48 | 26 | 42 | 37 | |
| 20 | Hung-shih-ngai .. | Star S. | 26 | 37 | 38 | 26 | 37 | 27 | |
| 21 | Tung-ch'uan Fu .. | Star S. | 26 | 24 | 59 | 26 | 24 | 48 | Examination Hall. |
| 22 | Hsiao-ch'ang-t'ang .. | Sun | 26 | 19 | 49 | 26 | 19 | 38 | |
| 23 | Chê-chi .. .. .. | Star S. | 26 | 14 | 37 | | | | |
| 24 | ,, .. .. .. | Star N. | 26 | 14 | 20 | 26 | 14 | 28 | |
| 25 | Lai-t'ou-p'o .. .. | Star S. | 26 | 1 | 42 | | | | |
| 26 | ,, .. .. | Star N. | 26 | 1 | 39 | | | | |
| 27 | ,, .. .. | Sun | 26 | 1 | 8 | | | | |
| 28 | ,, .. .. | Star S. | 26 | 1 | 27 | 26 | 1 | 40 | |

| No. | Station. | Object Observed. | Deduced Latitude. | | | Mean or corrected Latitude (N.) | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | ° | ′ | ″ | ° | ′ | ″ | |
| 29 | Kung-shan .. .. | Star S. | 25 | 45 | 7 | | | | |
| 30 | ,, .. .. | Star N. | 25 | 44 | 49 | 25 | 44 | 58 | |
| 31 | Liu-shu-ho .. .. | Sun | 25 | 40 | 9 | 25 | 39 | 58 | |
| 32 | Hsün-tien Chou .. | Star S. | 25 | 34 | 6 | | | | |
| 33 | ,, .. | Star N. | 25 | 33 | 34 | 25 | 33 | 50 | |
| 34 | Chiang-so .. .. | Sun | 25 | 26 | 28 | 25 | 26 | 17 | |
| 35 | I-lung .. .. .. | Star N. | 25 | 22 | 9 | 25 | 22 | 20 | |
| 36 | Ho-k'ou .. .. .. | Sun | 25 | 17 | 11 | 25 | 17 | 0 | |
| 37 | Yang-lin .. .. .. | Star S. | 25 | 13 | 36 | | | | |
| 38 | ,, .. .. .. | Star N. | 25 | 13 | 18 | 25 | 13 | 27 | |
| 39 | Ch'ang-p'o .. .. | Star S. | 25 | 7 | 46 | | | | |
| 40 | ,, .. .. | Star N. | 25 | 7 | 43 | 25 | 7 | 45 | |
| 41 | Fên-shui-ling .. | Sun | 25 | 5 | 24 | 25 | 5 | 20 | |
| 42 | Pan-ch'iao .. .. | Star S. | 25 | 3 | 6 | | | | |
| 43 | ,, .. .. | Star N. | 25 | 3 | 18 | 25 | 3 | 12 | |
| 44 | Yun-nan Fu .. .. | Star S. | 25 | 2 | 41 | | | | |
| 45 | ,, .. .. | Star N. | 25 | 2 | 35 | | | | |
| 46 | ,, .. .. | Star S. | 25 | 2 | 45 | | | | |
| 47 | ,, .. .. | Star N. | 25 | 2 | 55 | 25 | 2 | 44 | |
| 48 | Liao-i-p'u .. .. | Star S. | 28 | 54 | 37 | 28 | 54 | 0 | |
| 49 | Pao-an-ying .. .. | Star S. | 28 | 49 | 53 | 28 | 49 | 15 | |
| 50 | Têng-hsiang-ying .. | Star S. | 28 | 28 | 22 | 28 | 27 | 44 | |
| 51 | Ning-yuan Fu .. | Star S. | 27 | 54 | 14 | | .. | | Examination Hall. |
| 52 | ,, .. | Star S. | 27 | 54 | 3 | | | | |
| 53 | ,, .. | Star N. | 27 | 52 | 41 | 27 | 53 | 25 | |
| 54 | Huang-lien-p'u .. | Star S. | 27 | 41 | 19 | | | | |
| 55 | ,, .. | Star N. | 27 | 40 | 10 | 27 | 40 | 44 | |
| 56 | Ma-li-chai .. .. | Star S. | 27 | 32 | 8 | 27 | 31 | 30 | |
| 57 | Hsiao-kao-ch'iao .. | Star S. | 27 | 22 | 14 | 27 | 21 | 36 | |
| 58 | Chin-ch'üan-ch'iao .. | Sun | 27 | 11 | 32 | 27 | 10 | 54 | |
| 59 | Hui-li-chou .. .. | Sun | 26 | 39 | 35 | | .. | | Examination Hall. |
| 60 | ,, .. .. | Sun | 26 | 39 | 35 | 26 | 39 | 0 | |
| 61 | ½ mile N.W. of Hsiao-pa .. .. .. .. | Sun | 26 | 34 | 23 | 26 | 33 | 45 | |
| 62 | Liu-shu-wan .. .. | Sun | 26 | 35 | 56 | 26 | 35 | 18 | |
| 63 | Wa-wu .. .. .. | Sun | 26 | 53 | 47 | 26 | 53 | 10 | |
| 64 | Ch'iao-chia T'ing .. | Star N. | 26 | 54 | 14 | | | | |
| 65 | ,, .. | Star S. | 26 | 55 | 29 | 26 | 54 | 51 | |
| 66 | Ai-chuo .. .. .. | Star N. | 26 | 55 | 5 | | | | |
| 67 | ,, .. .. .. | Star S. | 26 | 56 | 32 | | | | |
| 68 | ,, .. .. .. | Sun | 26 | 56 | 6 | 26 | 55 | 48 | |
| 69 | Mao-p'o .. .. .. | Star N. | 26 | 57 | 55 | 26 | 58 | 33 | |
| 70 | Niu-ko-ch'ang .. .. | Sun | 27 | 2 | 58 | 27 | 2 | 20 | |
| 71 | Near Lung-shu .. | Sun | 27 | 18 | 29 | 27 | 17 | 51 | |
| 72 | Pai-fa-ch'i .. .. | Sun | 27 | 33 | 2 | 27 | 32 | 24 | |
| 73 | San-chia-chai .. .. | Sun | 27 | 39 | 27 | 27 | 38 | 50 | |
| 74 | Yang-liu-shu .. .. | Sun | 27 | 50 | 48 | 27 | 50 | 10 | |
| 75 | Huang-p'ing .. .. | Star N. | 27 | 52 | 0 | | | | |
| 76 | ,, .. .. | Star S. | 27 | 53 | 23 | 27 | 52 | 41 | |
| 77 | Sha-ho .. .. .. | Sun | 27 | 57 | 22 | 27 | 56 | 44 | |
| 78 | Kan-t'ien-pa .. .. | Star N. | 27 | 57 | 16 | | | | |
| 79 | ,, .. .. | Star S. | 27 | 58 | 40 | 27 | 57 | 58 | |
| 80 | Huang-kuo-shu .. | Sun | 28 | 0 | 2 | 27 | 59 | 24 | |
| 81 | Ya-k'ou .. .. .. | Star N. | 28 | 0 | 26 | | | | |
| 82 | ,, .. .. .. | Star S. | 28 | 1 | 35 | 28 | 1 | 0 | |
| 83 | Ting-chiang-ao .. | Sun | 28 | 5 | 3 | 28 | 4 | 25 | |
| 84 | Yu-fang-kou .. .. | Sun | 28 | 13 | 26 | 28 | 12 | 48 | |

| No. | Station. | Object Observed. | Deduced Latitude. | | | Mean or corrected Latitude. | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | ° | ′ | ″ | ° | ′ | ″ | |
| 85 | Ching-ti .. .. .. | Star N. | 28 | 13 | 42 | | | | |
| 86 | ,, .. .. .. | Star S. | 28 | 14 | 51 | 28 | 14 | 16 | |
| 87 | On bluff E. of Ching-ti | Sun | 28 | 15 | 5 | 28 | 14 | 27 | |
| 88 | Kuo-ch'ün-t'an .. | Star S. | 28 | 13 | 29 | 28 | 12 | 51 | |
| 89 | Hsin-tien-tzŭ .. .. | Sun | 28 | 14 | 51 | 28 | 14 | 13 | |
| 90 | Huang-lung-ch'i .. | Sun | 28 | 35 | 41 | 28 | 35 | 3 | |
| 91 | 1½ miles W. of Ming-yuan Bridge .. .. | Sun | 28 | 38 | 38 | 28 | 38 | 0 | |
| 92 | Sui Fu (Sü-chou Fu) in mouth of River Min. .. .. .. | Sun | 28 | 47 | 23 | 28 | 46 | 43 | |
| 92*a* | 2 miles above Niu-shih-pien .. .. | Sun | 28 | 48 | 11 | 28 | 47 | 31 | |
| 93 | ½ mile above middle of Chu-kên-t'an .. | Sun | 29 | 25 | 31 | 29 | 24 | 51 | |
| 94 | Mouth of T'ung river | Sun | 29 | 34 | 4 | 29 | 33 | 24 | |
| 95 | Chia-ting Fu (middle of east wall) .. | Sun | 29 | 34 | 40 | 29 | 34 | 0 | |
| 96 | Ta-t'ien-ch'ih .. .. | Sun | 29 | 24 | 0 | 29 | 23 | 20 | |
| 97 | Mu-hsü .. .. .. | Sun | 29 | 21 | 18 | 29 | 20 | 38 | |
| 98 | Fu-lin .. .. .. | Sun | 29 | 21 | 46 | 29 | 21 | 6 | |
| 99 | Ho-ch'ang-pa .. .. | Sun | 29 | 21 | 29 | 29 | 20 | 49 | |
| 100 | 1 mile W.S.W. of Lao-wa-hsüan .. .. | Sun | 29 | 14 | 48 | 29 | 14 | 8 | |
| 101 | Tzŭ-ta-ti .. .. .. | Sun | 29 | 17 | 53 | | | | |
| 102 | ,, .. .. .. | Star S. | 29 | 17 | 27 | | | | |
| 103 | ,, .. .. .. | Star N. | 29 | 16 | 0 | | | | |
| 104 | ,, .. .. .. | Sun | 29 | 17 | 28 | 29 | 16 | 44 | |
| 105 | Lao-wa-hsüan .. .. | Sun | 29 | 15 | 38 | 29 | 14 | 58 | |
| 106 | Na-erh-pa .. .. | Sun | 29 | 16 | 22 | | | | |
| 107 | ,, .. .. | Star N. | 29 | 14 | 37 | | | | |
| 108 | ,, .. .. | Star S. | 29 | 16 | 14 | | | | |
| 109 | ,, .. .. | Star N. | 29 | 14 | 38 | | | | |
| 110 | ,, .. .. | Star S. | 29 | 16 | 13 | 29 | 15 | 25 | |
| 111 | Ch'u-la Ravine .. | Star N. | 29 | 19 | 50 | | | | |
| 112 | ,, .. .. | Star S. | 29 | 20 | 53 | 29 | 20 | 20 | |
| 113 | Ta-chien-lu (100 yards N. of South Gate) | Star N. | 30 | 2 | 40 | | | | |
| 114 | ,, ,, | Star N. | 30 | 2 | 25 | | | | |
| 115 | ,, ,, | Star S. | 30 | 3 | 49 | | | | |
| 116 | ,, ,, | Star S. | 30 | 3 | 28 | 30 | 3 | 5 | |
| 117 | Lu-ting-ch'iao .. .. | Star N. | 29 | 54 | 27 | | | | |
| 118 | ,, .. | Star S. | 29 | 55 | 8 | | | | |
| 119 | ,, .. | Star S. | 29 | 55 | 24 | | | | |
| 120 | ,, .. | Star N. | 29 | 54 | 43 | 29 | 54 | 55 | |
| 121 | Fu-chuang .. .. | Star S. | 29 | 33 | 23 | 29 | 32 | 54 | |

# APPENDIX D.

## Longitude of Positions.

| No. | Station. | Date. | Method of Observation. | Longitude E. | | | Remarks. |
|---|---|---|---|---|---|---|---|
| | | 1877. | | | ° ′ | ° ′ | |
| 1 | Ch'iao-chia T'ing | Sept. 18 .. | Lunars .. .. | Jupiter W. 103 3·5<br>Saturn E. 102 39 | | 102 51·2 | Accept 103° 5′. |
| | | 1878. | | | | | |
| 2 | Tzŭ-ta-ti .. | March 24 .. | Do. .. | Spica W. 102 39·5<br>Jupiter E. 102 39·3 | | 102 39·4 | See No. 4, below. |
| 3 | Do. .. | „ 25 .. | Do. .. | Spica W. 102 27·6<br>Altair E. 101 33 | | 102 0·6 | Rejected. |
| 4 | Na-erh-pa .. | April 7 .. | Do. .. | Sun W. 103 1·2<br>Pollux E. 102 26·3 | | 102 43·8 | Station No. 2 is six miles west of Station No. 4 by D.R.; the two results may therefore be accepted as substantially correct. |
| 5 | Chia-ting Fu | June 19–25 | Chronometric difference with Ch'ung-ch'ing | .. | .. | 104 0 | |
| 6 | Sui Fu (Sü-chou Fu) | „ 21–25 | Do. .. | .. | .. | 104 51·6 | Capt. Blakiston has 104° 55′. |
| | | 1880. | | | | | |
| 7 | Ch'ung-ch'ing Fu | June 22 .. | Eclipse of Moon | .. | .. | 106 50·7 | Capt. Blakiston has 106° 50′. |

# APPENDIX E.

## Magnetic Variation.

| No. | Station. | Date. | Mag. Var. | Remarks. |
|---|---|---|---|---|
| | | 1876 | ° ′ | |
| 1 | Yunnan Fu .. .. .. | Mar. 11, P.M. | 4 10 | Mean: 4° 50′ E. |
| 2 | „ .. .. .. | „ 12, A.M. | 5 30 | |
| | | 1877 | | |
| 3 | Lu-ku .. .. .. .. .. | Aug. 26, P.M. | 3 0 | |
| 4 | Ning-yuan Fu .. .. .. | „ 28, „ | 4 20 | Chien-ch'ang Valley: Mean Mag. Var. about 4° 10′ E. |
| 5 | „ .. .. .. | „ 29, A.M. | 5 30 | |
| 6 | „ .. .. .. | „ „ P.M. | 5 0 | |
| 7 | „ .. .. .. | „ 30, „ | 4 0 | |
| 8 | Hsio-kao-ch'iao .. .. .. | Sept. 2, „ | 3 0 | |
| 9 | T'ieh-hsiang-fang .. .. | „ 3, „ | 4 45 | District of Hui-li Chou: Mean Mag. Var. about 5° 10′ E. |
| 10 | Hui-li Chou .. .. .. | „ 9, „ | 5 40 | |
| 11 | Chiang-chou .. .. .. | „ 12, „ | 4 25 | |
| 12 | Lo-po-ti .. .. .. .. | „ 19, „ | 6 30 | |
| 13 | Ai-chou .. .. .. .. | „ 20, A.M. | 5 15 | Mountainous region on right bank of Gold River. |
| 14 | 1 mile N. of Yeh-chu-chai | Oct. 1, „ | 30 0 | |
| 15 | San-chia-chai .. .. .. | „ „ P.M. | 7 30 | |
| 16 | Hsin-tien-tzŭ .. .. .. | „ 3, „ | 4 10 | |
| 17 | Near ditto .. .. .. .. | „ 4, A.M. | 4 0 | Valley of Gold River: Mean Mag. Var. about 3° 40′ E. |
| 18 | Ya-k'ou .. .. .. .. | „ 6, P.M. | 3 0 | |
| 19 | „ .. .. .. .. | „ 7, A.M. | 3 40 | |
| 20 | Near Ching-ti .. .. .. | „ 10, P.M. | 3 30 | |
| | | 1878 | | |
| 21 | Sui Fu (Sü-chou Fu) .. | Feb. 14, P.M. | 3 0 | Min river: Mean Mag. Var. about 2° 45′ E. |
| 22 | Tao-ssŭ-kuan .. .. .. | „ 24, A.M. | 2 30 | |
| 23 | Lu-lu-p'ing .. .. .. .. | Mar. 6, „ | 4 30 | |
| 24 | On Ma-lieh Mountain .. | „ 13, P.M. | 4 35 | Region of T'ung river: Mean Mag. Var. probably about 4° 30′ E., with great local deviation. |
| 25 | Near Lao-wa-hsüan .. .. | „ 21, „ | 7 25 | |
| 26 | Tzŭ-ta-ti .. .. .. .. | „ 22, „ | 7 50 | |
| 27 | Hsiao-ma-chang .. .. | April 16, „ | 4 50 | |
| 28 | Ta-chien-lu .. .. .. | „ 25, A.M. | 8 50 | |
| 29 | Lu-ting-ch'iao .. .. .. | May 20, P.M. | 4 30 | |

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## II. JOURNEY TO TA-CHIEN-LU, IN 1878.*

CHUNG-CHING, *July* 7, 1878.

I HAVE the honour to report my return from a journey which, originally planned as a mere New Year's holiday, extended, from one cause and another, to Ta-chien-lu. I had started with the intention of making a rough survey of the river between Kiating and Sui-fu (Blakiston's Sü-chow), and of crossing the mountains from the former city to Fu-liu, in longitude 103°. On reaching Fu-liu, however, the country further west held out so many attractions, that I was induced to travel on to Tzu-ta-ti, the head-quarters of a Sifan chief styled "Wang Ch'ien-lui" ("Wang of a 1000 families"). Here I heard of the existence of a mountain track to Ta-chien-lu, and it seemed a pity to miss the opportunity of visiting that famous border town; but I abandoned the project on receiving a hint from the chief that he could not guarantee my safety in so wild a region.

Thereupon I turned back; but at the village of Na-erh-pa, the first stage, I was robbed, during the night, of my travelling funds and of several miscellaneous articles of no great value. This placed me in a very awkward position, especially as the sub-assistant magistrate, who resides a day's journey from the place, failed to take any action in the matter. After giving him fair time to put in an appearance, I sent a messenger to the capital with a letter which he was to give to my old Yünnan acquaintance—the Taotai Ting Shih-ping, or to the Governor-General. The messenger returned in eleven days with a very considerate letter and a loan from the Taotai, and orders came simultaneously from, I presume the Governor-General, directing all the officials within four days' journey of the village to apprehend the burglars. The sub-assistant magistrate hurried to the scene, and I soon found that the culprits were well known to everybody in the village. Only one, however, was ulimately captured, the chief of the gang, warned by his wife, escaping over the mountain.

The magistrate had received such stringent orders to make good my losses that a scheme I had formed of deriving advantage from the misadventure by refusing reimbursement, and insisting that I had nothing for it but to go on to Ta-chien-lu and obtain funds, would not even bear proposal. Very conveniently, however, he could not pay me on the spot, but wished me to wait a few weeks until the money arrived from Yueh-hsi-T'ing. This I altogether declined to do, and the end of the negotiation was, that I offered to travel on to Ta-chien-lu and to receive payment on my return. This concession to his wishes he accepted with alacrity.

Payments of such indemnities are usually made by permanent Committees established for the purpose; but even if the loss fall ultimately on the natives of Na-erh-pa, I see no objection to their realizing the fact that the burglers whom they house in their midst are likely to become as disagreeable to them as they are to travellers.

So I again turn north-west. On the road to Tzu-ta-ti I met two packs of hounds, and discovered that they were sent by the Sifan chief to hunt any robbers in the event of their taking to the forest. Dramatic justice was dealt out to that potentate for his refusal to protect me, by the plundering of his father's grave; when I repassed Tzu-ta-ti ne had gone in pursuit of the marauders.

The country may perhaps be considered unsettled, but the remainder of the journey was impeded by nothing worse than natural difficulties, such as fevers and the extreme ruggedness of the mountain ranges. We quitted cultivation at the

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* Reprinted from the Parliamentary Report, CHINA, No. 2 (1879).

foot of a pine forest, through which we travelled three days, ascending continually until we came to a snowy pass—the only pass in the country which, as the natives say, "hang jên," stops people's breathing. Descending its northern slope we soon found that we had left China behind. There were no Chinese to be seen. The valley was nearly all pasture land, on which were grazing herds of hairy animals, resembling immense goats. These I rightly conjectured to be yaks. On entering a hut, I found it impossible to communicate with the family, even a Sifan, whom I had brought with me, being unintelligible to them; but they were polite enough to rescue me from the attack of the largest dogs I have ever seen, and to regale me with barley meal in a wooden bowl, which I had to wash down with a broth made of butter, salt, and tea twigs. Further on we met a company of cavaliers, armed with matchlocks and sabre, and decorated with profuse ornaments in silver, coral, and turquoise; a troop of women followed on foot, making merry at my expense. A mile or two further, and I came to a great heap of slates, inscribed with Sanscrit characters, whereupon I began to understand that we were in Tibet; for although Tibet proper is many hundred miles west of this point, yet tribes of Tibetan race and language extend right up to the bank of the T'atu river—a fact which I had not been led to expect.

At the foot of the valley we struck the high road from Li-t'ang to Ta-chien-lu, and I walked into the latter town on the evening of the 23rd April.

I stayed there three weeks, and learned much regarding the condition of the numerous countries included in the general name of Tibet. Inquiries respecting commercial production and distribution occupied most of my time, and I shall have a good deal to report which is interesting and, I think, useful.

We returned to Fu-liu by the high road, and the sub-magistrate of Ta-shu-pu duly paid over the sum of 170 taels, the estimated total of my losses.

From Fu-liu to Kia-ting we followed the by-road by which we had come. I took the opportunity afforded by the arrival of a Lolo chief, who called upon me, to make notes of the customs and language of his tribe. I had previously collected a sufficient vocabulary of one of the Sifan dialects.

From Kia-ting we dropped easily down the flooded current, in six days, to Chung-ching, without encountering a single rapid, and in deep water all the way, making Chung-ching on the 24th June, after an absence of nearly five months.

The information collected during my journeys enables me to report, with some confidence, on the trade and production of Western Ssŭ-ch'uan, and their bearing on the commercial capabilities of Chung-ching. I am preparing a report on this subject, which I propose to supplement with a full account of my explorations.

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## III. NOTES ON THE ROUTE FOLLOWED BY MR. GROSVENOR'S MISSION THROUGH WESTERN YÜNNAN, FROM TALI-FU TO T'ÊNG-YUEH.*

"When you have left Carajan and have travelled five days westward, you find a province called Zardandan. The country is wild and hard of access, full of great woods and mountains which it is impossible to pass, the air is so impure and unwholesome; and any foreigner attempting it would die for certain."

Thus Marco Polo, in the fiftieth chapter of his second book.

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* Reprinted from the Parliamentary Report, China, No. 3 (1878).

We, who had the good fortune, though for most lamentable reason, to follow many of his steps, searched his book page by page as we journeyed day by day; and it is with the view of supplementing his memoirs, and assisting future explorers who may enter the same region, that these few notes are prepared.

That Yachi and Carajan represent Yünnan-fu and Tali, is proved by topographical and other evidence of an overwhelming nature. I venture to add one more proof, which seems to have been overlooked.

If there is a natural feature which must strike any visitor to those two cities, it is that they both lie on the shore of notable lakes, of so large an extent as to be locally called seas; and for the comparison, it should be remembered that the inhabitants of the Yünnan province have easy access to the ocean by the Red River, or Sung-Ka. Now, although Marco does not circumstantially specify the fact of these cities lying on large bodies of water, yet in both cases, two or three sentences further on, will be found mention of lakes; in the case of Yachi, "a lake of a good hundred miles in compass"—by no means an unreasonable estimate.

Tali-fu is renowned as the strongest hold of Western Yünnan, and it certainly must have been impregnable to bow and spear. From the western margin of its majestic lake, which lies approximately north and south, rises a sloping plain of about three miles average breadth, closed in by the huge wall of the Tien-tsang Mountains. In the midst of this plain stands the city, the lake at its feet, the snowy summits at its back. On either flank, at about twelve and six miles' distance respectively, are situated Shang-kuan and Hsia-kuan (upper and lower passes), two strongly fortified towns guarding the confined strip between mountain and lake; for the plain narrows at the two extremities, and is intersected by a river at both points.

Shang-kuan we had no time to visit. Hsia-kuan, built on a river to which it gives its name, is circled by a labyrinth of walls. One long arm of masonry even follows the right bank of the river into a gorge through which the high road passes, and there finds an appropriate terminal in a solitary tower of native rock. These two outflanking fortresses constitute the strength of Tali-fu.

That city is a more or less regular square of one mile and a quarter, surrounded in the usual manner by a high wall backed with earth. Of itself it is neither stronger nor weaker than other Chinese cities; but so long as Shang-kuan and Hsia-kuan are held, it is unapproachable except by the snowy passes in its rear. It was by these passes, we were told, that the Mohammedan insurgents succeeded in capturing the place. The long, narrow plain—some eighteen miles by three—celebrated as the most fertile rice ground in Yünnan, affords the garrison and people an abundant harvest of provisions, and the lake never fails to supply a plentiful tribute of excellent fish.

The fish of Chinese lakes and rivers are generally very insipid and unappetising, a fact which is usually attributed to the muddiness of their native waters. But the streams and meres of Yünnan are remarkably clear, with gravelly bottoms. The tastelessness of the fish is more probably to be accounted for by their being kept alive in impure and unchanged water until their sale to consumers.

A visit to Tali-fu entails a deviation from the main western road, and we were met (exactly as was the experience of our poor friend Margary) with objections on the part of the authorities to our branching off to their city.

The Chinese seem or pretend to be incapable of understanding the restless curiosity of foreigners who waste their time in exploring regions to which their business does not necessarily conduct them. In such cases we never paused to discuss matters; we stood not upon the order of our going, but went.

All before us was now a land of mystery. Margary had indeed traversed it, but

his journal stops short two days before reaching Hsia-kuan. The continuation was no doubt carried off by his murderers; it is clear that they would have hastened to destroy documents which might have contained an intimation of expected foul play.

Is the Tali range snow-capped? was a question often discussed by us. Margary himself, who had passed several days in full view of those forbidding heights at much the same season as ourselves, observed no snow, and even ridiculed the supposition of its existence in conversation with Colonel Browne; on the other hand, Mr. Garnier, an explorer of the highest authority, describes the chain as "couverte de neige pendant neuf mois de l'année."

At the station before Hsia-kuan, from which place the heights are not visible, one of our party made careful inquiries about the duration of the snow. His informants, some of whom had crossed the passes, laughed outright at his scepticism, and told him that on reaching Hsia-kuan next morning he would find snow hawked in the streets, that the snow rarely melted in the summer, and that a bad harvest and many diseases invariably followed its disappearance. On rounding a spur of the hills which wall in the southern end of the Tali valley, we came abruptly into full view of the western range, rising and receding into black saw-like peaks, the summits of which, sheeted with brilliant white, seemed nearer and more real than the lower mass of the mountain. There seems no reason to doubt the statement that the Sierra is generally snow-capped all the year round, but only slightly so during the hot months.

I am not aware what is the line of perpetual snow in this latitude (25° to 26°); but we were satisfied that the heights towered from 7000 to 8000 feet over us, raised as we already were 7000 feet above the sea-level.

The range is, in character, what Mr. Garnier calls it, a "chaine," ruggedly serrated, but with no very prominent peak. The highest point, as it seemed to us, lay about north-west of the city.

The view given in Mr. Garnier's work depicts very fairly the general appearance of the range, but the colour is unsatisfactory, and from the southern end, at which we entered the plain, the mountain mass bears a much bolder and grander proportion to the breadth of the lake.

Although now within a few hundred yards of that glorious sheet of water, we were at first much puzzled at not seeing it, the explanation being that a slight undulation of level, not apparent to the eye, intervened, over which the sight passed immediately on to the opposite hills without being conscious of the interval, just the same illusion, in fact, that is often taken advantage of by scene-painters. The road here lies through a weary bed of sand and shingle, but the traveller is cheered by a charming view of Hsia-kuan, glistening white at the mountain foot.

Shortly before reaching that town, we passed a family on their way to the quarterly fair of Tali; they consisted of a man, two women, and a child. The man was a wild-looking copper-coloured creature, somewhat resembling a Mongol, clad in a single sack of very coarse woollen cloth, wretchedly poor, but cheerful notwithstanding, and disposed to be communicative. But as he had made even less progress in the Chinese tongue than ourselves, knowing in fact little more than the numerals, interchange of ideas was attended with occasional difficulty. All we could elicit from him was that he came from Kutung, or was a Kutungman.

We had previously met people of the same description engaged as conductors of caravans, but neither we nor our Chinese following ever succeeded in understanding them, nor could we obtain any information from officials nor people regarding them, except that they were Kutungmen. What or where Kutung is, I have not to this moment any idea. The men are of a dark reddish complexion, with rather

prominent features, above the average height, and well proportioned, dressed in close-fitting woollen garments, which in some cases we observed to be neatly cut and handsomely embroidered. The Chinese have not acquired the art of spinning and weaving wool, and the clothes of these people never came, it is evident, from a European loom.

The two women, aged about twenty-five and seventeen years respectively, at once arrested our attention. I have the authority of my two companions for stating that they would have been considered handsome anywhere. Paler in colour than the man, their oval and intelligent faces instantly reminded us of the so-called Caucasian type; and in every step and movement there was a decision and exactness widely different from the sluggish inaccentuation of the Chinese physique. The younger was particularly remarkable for a peculiarity of her long hair, which was naturally wavy, or "crimped," a feature which is never met with among the Chinese. While watching these people, I felt in the presence of my own race.

Their straight and shapely forms, ill-concealed by a very short and scanty gown, their sympathetic demeanour, their poverty, and their presence with ourselves in a strange land, may possibly account for the interest my two companions evidently felt in them.

The river which relieves the excess of the lake at its south-west foot is not visible from the road until one is in the act of crossing it in Hsia-kuan. We breakfasted in the suburbs of that town without having succeeded in discovering its stream, and in fact we began to feel incredulous of its existence, especially as the rivulets we had passed all ran towards the lake. But shortly after starting again, we crossed, by a fine arched bridge in the centre of the town, a clear and winding stream about 35 yards in breadth. So slow was the current, that we could only detect its direction by noticing the inclination of the water-weeds.

Snow from the mountain-top was being offered for sale, and we celebrated the event by iceing the last bottle of our dozen of champagne. The said vintage was designed for the purpose of entertaining native officials, but it is to be feared that our hospitality was, on occasions, not altogether disinterested.

We bought here for a dollar two pairs of magnificent Amherst pheasants, which we confided to our taxidermist.

Through a long paved street, up a steep incline, we quitted Hsia-kuan and entered upon the slope which rises from the margin of the lake to the mountain spurs. The land here is thickly cultivated, principally with rice, for which crop it possesses a great reputation.

We were told that before the Mohammedan insurrection the route from Hsia-kuan to Tali, about 9½ miles long, was one continuous street; but this does not seem probable. The traces of Mohammedan and Imperialist destruction are very distinct. Temples and houses still lie where they fell. But such ruins were not very frequent along the roadside. Still the place must once have been wealthy and populous, as is proved by the massive stone bridges, often of luxurious and superfluous size, spanning the numerous torrents which run down to the lake.

The fine trees which once adorned this slope have, with a few lone exceptions, disappeared. The idols lie in fragments beneath the ruins of their desecrated shrines. One temple alone, about six miles from Tali, relieves the monotony of ruin and desertion; it is new built and indeed uncompleted, having been lately erected by Ts'en, the Governor, and the Generalissimo Yang-yü-k'ê. The usual miniature pond with gold fish, complete, is shadowed by the conventional toy bridge and willow-pattern balcony; but the effect is pleasing enough, the fine white marble of the Tali quarries furnishing the materials.

We passed a pleasant hour of rest in this temple. The commandant of our

Chinese escort—whose name, by the way, translated according to the approved method of Abbé Huc, is not inappropriate to his profession, "Hill-echoing Thunder"—narrated to us how he conveyed with exceeding difficulty four foreign guns ("pièces de cinq" only, as we ascertained from a missionary) over the rugged route from Yünnan-fu, and how the capture of the city was to be attributed solely to his own exertions. One gun was irreparably damaged *en route*, but the surviving three laid and pointed by himself, according to his account, terminated the rebellion. There seems no doubt that these guns, cast by French workmen in Yünnan-fu, were really the main cause of the Mohammedan surrender.

General Thunder told us, what was subsequently confirmed, that when the Mohammedans had surrendered and given up their arms, Tu Wên-hsiu, the so-called "sultan," came into the camp of the besiegers, borne in a sedan chair, and inquired for Ma, the Imperialist commander. Being introduced to his presence, he begged for a cup of water, which being given him, he said, "I have nothing to ask but this—spare the people" ("Shao-shajên"). He then drank the water, and almost immediately expired. It appears that he had taken poison, which was suddenly brought into action by the water. His head was immediately cut off and exposed, and, heedless of his prayer—probably the most impressive and pathetic ever uttered by a dying patriot—the victors proceeded to massacre the helpless garrison and townsfolk.

The greater part of the able-bodied men, no doubt retaining some of their arms, succeeded in escaping; but a number of unresisting people, principally old men, women, and children, fled from the city into the rice-fields which border the lake. Hemmed in by the Imperialist pursuers, they entered the water, into which they retreated further and further; and being still pressed, were either forced out of their depth by the crush, or sought a refuge from worse ills in a voluntary death. The number of those who perished in this way has probably been greatly exaggerated. The foreign press put it at from 3000 to 9000. General Thunder, undoubtedly an eye-witness, and probably a participator, told me, as we sat in the sunny verandah of the temple overlooking the scene of these horrors, that he did not think there could have been more than 500 corpses, or "the water would have stunk more." The gallant general was of opinion that Tu Wên-hsiu was a good and conscientious ruler, and respected even by his Imperialist foes; but for the Moslems generally, he professed much contempt.

We were now in full sight of Tali-fu, as unpicturesque a city as any in China. The ruins of an extensive suburb line the approach to the south gate, but within the walls we saw little trace of destruction. We found lodging in a caravanserai of more than average dampness and discomfort, which had been the scene of a horrible episode of massacre; nearly 1000 Mohammedan partisans (all our informants agreed in the number), mostly men who had laid down their arms, were here pent up by the Imperialists and deliberately butchered. The inn is reported to be haunted by their spirits, and consequently drives a very poor business. Future visitors will easily identify it by its situation near the fish market, in the central part of the town.

Tali is only in part inhabited, and that not thickly. We did not succeed in finding a single large shop. But about a mile outside the west gate the quarterly fair (*yueh-kai*) was being held, presenting a very animated scene. Some 5000 people, many of them non-Chinese, were present, and good order is evidently maintained, as valuable wares are exposed with security. In the thick of the throng we met our friends of Kutung, and many other outlandish folk. Lolos were rubbing elbows with people from the Shan districts, and Tibetans, the dirtiest race we had ever seen in this land of dirt, where most of the matter is in the wrong place, were chaffering with sleek Cantonese. A Fakir with a praying machine, which he twirled for the

salvation of the pious at the price of a few cash, was at once recognised by us; he was our old acquaintance, the Bakhsi, whose portrait is given in Colonel Yule's 'Marco Polo.'

At the upper end of the fair we found many varieties of goods from Tibet exposed for sale; among others a very stout description of serge, obviously not Chinese, of which a specimen will be found in the trade collection, and an endless exhibition of the "omnium gatherum," generally known as Chinese medicines. Enormous dried centipedes, tied up in bundles, were in much request.

Very few Manchester goods were seen, although the fair is chiefly a market for clothing materials. We observed Russian broadcloth, and the commercial motto of Sweden, "Utan fosfor och svafel," was prominent. The greater part of the goods and traders seemed to come from Canton, and the few foreign goods probably found their way from that city.

The lower part of the fair was occupied by lodging booths and restaurants bordered by stalls, on one of which it was interesting to find a copper knife and a stone celt. I purchased both for a few cash. The knife is undoubtedly genuine; the celt, called locally, and indeed all the world over, "thunder-stone" (*lei-ta-shih*), bears traces of sharpening on the axe-edge, and is well adapted for use; but as these objects are now employed as charms on account of their supposed supernatural origin and properties, and as there is a brisk demand for them, it is difficult to satisfy oneself of their authenticity. The original type would, however, be retained, and it is curious to observe how perfectly this exemplar agrees with European forms.

We met with a considerable stock of silversmith's work and jade carving. The cost was much greater than in Eastern China, but, nevertheless, sometimes several articles for which we bargained were sold to natives for higher prices than we had considered reasonable, arguing that there must somewhere be more wealth than we found signs of. We noticed some very handsome lime-boxes of silver filigraine work.

In Western Yünnan the betel-nut is chewed with prepared lime, colouring the teeth red and causing a profuse expectoration. We first met with the practice near Tali-fu. In fact, we had been for some days importuning our geologist to account for certain red streaks on the roadside rocks. His explanation was plausible enough: some people can explain anything, but he was soon found out.

Is it not possible that the red colour imparted to the teeth by the practice of chewing betel with lime may go some way to account for the ancient name of this region, "Zar-dandan," "Chin-ch'ih," or "golden teeth"? Betel-chewing is of course common all over China; but the use of lime is almost unknown and the teeth are not necessarily discoloured.

In the neighbourhood of Tali one comes suddenly upon a lime-chewing people, and is at once struck with the strange red hue of their teeth and gums. That some of the natives used formerly to cover their teeth with plates of gold, from which practice, mentioned by Marco Polo and confirmed elsewhere, the name is generally derived, can scarcely be considered a myth; but the peculiarity remarked by ourselves would have been equally noticeable by the early Chinese invaders, and seems not altogether unworthy of consideration. It is interesting to find the name "Chin-ch'ih" still in use.

When Tu Wên-hsiu sent his "Panthay" mission to England with tributary boxes of rock from the Tali Mountains, he described himself in his letter "as a humble native of the golden teeth country."

The word Panthay has received such complete recognition as the national name of the Mohammedan revolutionaries in Yünnan that I fear it will be almost useless to assert that the term is utterly unknown in the country which was temporarily under

the domination of Sultan Suliman, otherwise Tu Wên-hsiu. The rebels were and are known to themselves and to the Imperialists by the name of Hui-hui, or Hui-tzu (Mohammedans), the latter expression being slightly derogatory.

The name of "sultan," utterly foreign to the ordinary Chinese, was never applied to their ruler, except perhaps by the two or three hadjis among them. The name "Suliman" is equally unknown. The Mohammedans of Yünnan are precisely the same race as their Confucian or Buddhist countrymen; and it is even doubtful if they were Mohammedans except as far as they professed an abhorrence for pork. They did not practise circumcision, though I am not sure if that rite is indispensable; they did not observe the Sabbath, were unacquainted with the language of Islam, did not turn to Mecca in prayer, and professed none of the fire and sword spirit of propagandism.

That they were intelligent, courageous, honest, and liberal to strangers, is as certain as their ignorance of the law and the prophets. All honour to their good qualities, but let us cease to cite their short-lived rule as an instance of the "Great Mohammedan Revival."

The rebellion was at first a question of pork and of nothing else, beginning with jealousies and bickerings between pig butchers and the fleshers of Islam in the market places. The officials who were appealed to invariably decided against the Mussulmans. Great discontent ensued and soon burst into a flame.

The first outbreak seems to have originated among the miners, always a dangerous class in China, who were largely composed of Mohammedans. The usual measures of exterminative repression were adopted by the officials; their Confucian hostility against any faith or society which possesses an organisation novel to or discountenanced by the Government, was aroused; a general persecution ensued; the Mohammedans made common cause, excited, it is very possible, by their travelled hadjis; and so began the period of disorder and disaster with which we are acquainted.

Regarding the faith of these unfortunate people, Dr. Anderson writes, "Our Jemadar frequently lamented to me the laxity that prevailed among them, and my native doctor held them in extreme contempt, and used to assert that they were no Mussulmans."

As regards the illogical atrocities which the Chinese official mind justifies, one anecdote will suffice.

A few weeks before our arrival at Yünnan-fu, a rising occurred in the north of the province, occasioned by the extortionate proceedings of a prefect. The insurgents committed no outrages, but simply assumed an attitude of protest. The movement was suppressed with curious suddenness, and we were fortunate enough to meet the military officer who had restored order On being congratulated on his success, he replied, "Yes, they were harmless people, and not in the least to blame. I only had to kill a few ('pu-kuo-shao-ti-sha'), and the affair was over."

We strolled several times up and down the main street of Tali. For a Chinese street it is a wide and not uncleanly avenue, but the houses are very mean. The most remarkable sight was the market-women belonging to some non-Chinese race, who came in from the country with fish and provender for baggage animals. They would be pronounced comely if it were not for their dreadfully excoriated bare legs. We observed the same women and the same legs at Yünnan-fu.

In the street near the north gate were two curious objects, the use of which we could not satisfactorily ascertain. They were made of bronze, well cast, and resembled howitzers, but had no trunnions, nor, as far as we could find, any rudiment of a touch-hole. Moreover, they seemed so thin that it would have been dangerous to fire them. They were about 8 inches in diameter at the muzzle, and perhaps 6 inches in bore, being some 4½ feet long, and were not supported on

carriages, but laid in cages with their muzzles elevated towards the gate. They are probably the guns which protected the gateway of Tu Wên-hsui's palace during the rebellion, and were intended to fire grape, but how they were to be fired remains unexplained. It is, however, possible that they have been carefully and accurately spiked without leaving any trace of the operation. The dimensions are from memory.

On the 15th of April we returned to Hsia-kuan. Leaving the town the next morning, and following the left bank of the river which issues from the lake, we were surprised to find that rather imposing stream, which seems almost navigable, suddenly plunge under a natural bridge of rock, and become a rushing torrent.

That a boat once came up the Mekong and entered the lake by this branch, as local tradition has it, is clearly fabulous. About a mile from Hsia-kuan the route enters a gorge by a massive gateway, part masonry and part rock, which forms a fit portal to the majestic scenery it guards. The precipitous mountain sides are at first bare and rugged, but an hour's walk along an easy road brings the traveller into a well-wooded region. At 2¼ miles from Hsia-kuan, the hamlet of Fang-tzu-pu is reached, remarkable for its hot spring. The route traverses the mountain side at a considerable height above the river, but descends again to its level immediately after passing Shih-ch'uan Shao, 5½ miles.

So far, there is very little cultivation, the way being a mere mountain pass; but, on approaching the scattered huts which comprise Mao-t'sao-t'ang, 7¼ miles, a wheat crop was observed, and further on the inevitable poppy-field.

The route now becomes densely wooded, and coasts along the river through pleasant glades of walnut trees. The 40 yards' breadth of clear stream which lingered through the sands of Hsia-kuan here appears a sheet of foam 10 yards broad, surging over enormous boulders. It is easily crossed by bamboo bridges in several places; but, as our midday stage, the hamlet of Hsiao-ho-chiang, was already in sight, we followed a roundabout path, and gained the other bank by means of a tree which a freak of nature has made to grow horizontally over the torrent.

Hsiao-ho-chiang is 9¼ miles from Hsia-kuan. The local estimate is 45 *li*, but it is nearly impossible to obtain any even approximately exact idea of distances in these regions from the Chinese. We heard, for instance, with incredulous ears, that the distance between two places depended upon which end one started from; and all the informants, separately questioned, would give much the same differential estimate. Thus, from A to B would unanimously be called one mile, while from B to A would with equal unanimity be set down as three. An explanation of this difficulty, offered by an intelligent native, was this: carriage is paid on a basis of so many cash per mile; it is evident that a coolie ought to be paid at a higher rate if the road is uphill. Now it would be very troublesome to adjust a scale of wages rising with the gradients of the road. It is much more convenient for all parties to assume that the road in difficult or precipitous places is longer. This is what has been done, and these conventional distances are now all that the traveller will succeed in ascertaining.

"But," I protested, "on the same principle, wet weather must elongate the road, and it must be further by night than by day."

"Very true, but a little extra payment adjusts that."

This system may be convenient for the natives, but the traveller finds it a continual annoyance.

The scale of distances is something like this:—On level ground one statute mile is called two *li*. On ordinary hill-roads, not very steep, one mile is called five *li*. On very steep roads one mile is called 15 *li*. The natives of Yünnan, being good mountaineers, have a tendency to underrate the distance on level ground, but there

is so little of it in their country that the future traveller need scarcely trouble himself with the consideration. It will be sufficient for him to assume five local *li*, except in very steep places, as being one mile.

From Shih-ch'üan-shao to Hsiao-ho-chiang there are two routes, one on either bank. That on the left is preferable.

While at tiffin we received a deputation from Ho-chiang-pu, the village at which we intended to pass the night, entreating us to stay where we were. It was a very great distance to that place, the road was almost impassable, the inhabitants were very turbulent, and suffered from an infectious plague, and the village was so small that we should be unable to find food or lodging. We possessed, however, sufficient experience of the "splendid mendacity" of the Chinese to make us feel satisfied that these stories were fiction, and we were accordingly not in the least surprised when, after strolling a mile along an easy path, we were greeted with the smiles of the healthy-looking villagers of Ho-chiang-pu (10½ miles). The object of the deputation was made evident when we discovered that a subordinate Chinese official was also putting up at the village. He no doubt feared that we should occupy the best quarters, and his apprehensions were realised.

Ho-chiang-pu ("the meeting of the waters") is an inconsiderable walled village, protecting the western entrance to the pass which we had been threading. It occupies a lovely situation near the junction of three torrents, the Hsia-kuan river, the Ch'üan-chiao, and the Yang-pi, whose combined streams flow on, keeping the name of Yang-pi, to join the Mekong. The Ch'üan-chiao river takes its name from a stone bridge which we shall shortly cross. The Hsia-kuan river is also called the Ho-chiang.

The village boasts two or three tolerable inns, and would be a most convenient centre from which to explore this interesting region. The four valleys traversed by these three streams and their continuation, afford every variety of mountain scenery, from the undulating thickly-wooded hills near the village to the snow-tipped "horns" and "teeth" of black rock which overhang the town of Yang-pi.

To this place we must hasten. Issuing from the village, we seem about to plunge into a dense forest; but this ceases on the margin of a triangular cultivated patch about half a square mile in extent, at the junction of two of the streams. Inclining to the north an execrable road dips into a gully, and we soon cross the Ch'üan-chiao bridge over the stream of that name, at the mouth of a magnificent glen. The torrent rushes joyously along between mountains of inaccessible steepness, which are clothed to the very summit of the precipices with flowering or bright-leaved woods. The snowy peaks which crown the whole are not visible from this point, but the consciousness of their awful dominance is always present.

We passed no nook in our whole journey across China more worthy of close exploration than this; and we are confident that the traveller of the future will record a debt of gratitude to us for having pointed it out. It will lead him to the inmost heart of the range by what appeared to us a very practicable path. The range possesses a sacred and emblematic character. The envoys sent by the "Panthay" Sultan in 1871 carried with them pieces of rock hewn from the four corners of the mountain, as the most formal expression of his desire to become feudatory to the British Crown. Our unsentimental Foreign Office, blind to romantic symbolism, would not suffer them to be extricated from the bonded warehouse of the Customs; yet it seems unlikely that the tariff includes among forbidden imports the sacred rock of the golden teeth.

To our exceeding depression we are only permitted a passing glimpse of this paradise, and must continue our inexorable way across a wooded spur to the hamlet of Chi-i-pû (12 miles). The valley we are now ascending is much less verdant, and the inclosing hills lower, but we have scarcely recovered from our late disappointment,

when, after passing Chin-niu-tun (13¾ miles), a mere hamlet, an opening on our right suddenly reveals the central snowy sierra.

Replete as this mountain system is with surprises, no contrast is so striking as here meets our gaze. At the foot of a rift in a wall of dark rock, apparently 600 or 700 feet in height, but possibly much more, vegetation suddenly ceases, and between the vertical sides of the chasm issues a torrent from the very feet of the giants within. The eye in vain attempts to penetrate the interior gloom of this gulf, which is probably not more than two miles distant from the road, and easily accessible. The contrast between the sudden black mass of rock and the green and gradual slope which approaches it, utterly confuses all perception of distance; the shadows thrown by the pinnacles and crags above deepen the obscurity, and the sight ascends, helpless and hopeless, to the final contrast of the dazzling snows. It is an absorbing scene; but our instructions are to travel with all despatch. We hurry on with many a backward glance, and a vow that these murky gates shall one day open to us.

The road at this point is worse than ever, being in one place the bed of a torrent with no stint of water. The valley gradually broadens, or rather the floor rises, until an uninviting down, broken by sandy gullies, has to be ascended. T'sao-hsieh-p'u was the name of the place at which we expected to find tiffin awaiting us, but we searched in vain for Tsao-hsieh-p'u. We heard afterwards that a hamlet of that name formerly existed, but had been deserted from want of water; it was strange how utterly the habitations had disappeared.

After a halt of two hours at Ma-ch'ang (15¾ miles) a circuitous route leads us round an elbow of the river and we soon catch sight of the town of Yang-pi, a fortress of great importance, as Chinese fortresses go, guarding a pass over the mountain by which the rear of Tali-fu can be gained. This pass is officially closed during six months of the year, but is frequently crossed by contrabandists who know every detail of the range. The Chinese officials draw very little distinction between smuggling and brigandage, the penalties being practically the same for both derelictions; it follows that a smuggler often develops into a brigand, and as a consequence all mountain ranges and border lines have the reputation of being infested by robber bands. Thus, by an easy transition, the heavily taxed people take to smuggling, smugglers become bandits, bandits become rebels, and when occasion serves, whole districts are in revolt.

The little town of Yang-pi has often played an important part in the repression of such disorders. After the capture of Tali-fu about 2000 Mohammedans, we were told, took refuge in the mountains, but the approaches to Yang-pi being secured by its garrison, they were unable to descend, and most of them perished of cold and starvation in the upper passes. Viewed from this side, the town is very picturesque, being broken by the necessity of its situation into two divisions on different levels about half a mile apart, built in the midst of a curious convolution of water. The entrance to the lower town (Hsia-ch'êng, 19¾ miles) is very strongly guarded by high loopholed walls, between which the road passes for some fifty paces before the place is entered.

To the north the spurs of the Tali mountains break into a number of low plateaux, among which the Yang-pi river winds, apparently taking its rise away in the north-west, and not in this range. It is represented in all maps as a bifurcation of the Mekong; but in so mountainous a country one is loth to believe that rivers can divide in this way.

The valley of the Yang-pi, to judge from the latest native map (which we found very trustworthy as regards names, though inexact in positions) is continuously populated up to the point where it diverges from the Mekong, near a village called

Hsiao-tien, whereas the Mekong valley is depicted as being almost uninhabited. It would, therefore, seem that the easiest way of reaching the Upper Mekong is by ascending the former valley.

The Yang-pi river, after receiving the two streams at Ho-chiang, ultimately rejoins the Mekong. Its name, locally pronounced Niang-pi, has an un-Chinese sound, and the elaborate characters used in writing it give one the impression that they were specially invented for the purpose. It is probably, like many others, an indigenous name, which was in use before the Chinese occupation.

We passed the night comfortably enough in a hostel in the lower town. This, like many houses in Yünnan, possessed an upper story. The houses are often built entirely of wood, and the upper room, generally clean and fresh, is in some cases 45 feet long, and of proportionate breadth. A better lodging in mild weather could scarcely be desired. The tax-office (*Lekin*) was usually the newest and most conspicuous edifice in every village, and we passed many a night in those well-abused institutions.

A mountain rill runs down the side of the main street of the lower town, and in one place forms a convenient shower bath, a hint for which the future traveller will be grateful, as well as for the information that the lower town affords better lodging than the upper. We were fortunate in procuring some fairly good tobacco here—our supply had given out at Tali-fu—and the recovered pleasure yielded an additional zest to the prospect of the star-lit mountain snows.

The discomfort of travel in these regions is no doubt very great; but, on the other hand, the foreigner will meet with at least one agreeable compensation, in being able to pass to and fro without being pestered by the curiosity of impertinent rowds. We strolled about the cities and villages with perfect freedom and convenience often in crowded places such as the fair at Tali, without attracting much notice from the bystanders. This is no doubt to be attributed in some degree to the presence of so many non-Chinese races in and around the province. Burmese, Tungkingese, Shans, and a host of petty tribes, are familiar to the people of Western Yünnan, and we were no doubt confounded with one or other of these.

The abusive term, "foreign devil," seems unknown in Ssŭ-ch'uan and Yünnan; we were assailed with it for the last time at the foot of the first rapid above Ichâng. The natives of Ssŭ-ch'uan have a superstitious objection to pronouncing the word *Kuei* (devil). "Talk of the devil, he's sure to appear," they argue. We met with the same feeling against ill omens on the high plateau north of Yünnan-fu, a region swept by desolating winds, which make it in places almost uninhabitable. By a similar logical process the storm-swept natives have banished the word "wind" from their vocabulary, and substituted an expression which literally means "the waves are blowing." Our humourist remarked that this was merely another instance of the curious inversion of thought and custom which Europeans so often meet with in China; for there are Western countries, the natives of which are willing to employ almost any language for the purpose of raising the wind.

Yang-pi has no legal right to be called a town, being under the jurisdiction of only a sub-assistant magistrate (Hsün-chien), and a lieutenant (Pa-tsung).

Next morning, the 18th April, we crossed, by a dilapidated wooden bridge, the small stream which divides the town, and passed through the upper division (Shang-Chêng). We found it dirty and meanly built; very different from the promise our first view of it held out. An iron suspension bridge, 43 yards in span, takes us over the river, and we enter a bare valley, at the head of which is the village of Pei-mên-pú (22 miles), consisting almost entirely of new houses, or houses in process of construction. The situation is at the foot of a very steep ascent. It is noticeable that villages are often built in such positions, showing that the inhabitants make their

living by supplying the wants of wayfarers. In this spot, at any rate, there is nothing else to create a population.

The region we were now entering may be seen, by a glance at any map, to be perhaps the least populated of any in Western Yünnan. For a considerable distance in every direction there is not even a village worthy of the name. After climbing the steep ascent above Pei-mên-pú, we overlooked, on either hand, an interminable system of parallel ranges, covered with jungle and small timber. The ridge was soon crossed, and as we descended in a south-west direction into a narrow valley, the rivulets soon began to issue from the hill-side and combine until, in a very few miles, we found ourselves accompanied by a mountain torrent. Ch'ing-shiu-shao, a miserable hamlet (27 miles), afforded us tiffin, and T'ai-p'ing-pú (20½ miles), a mere cluster of huts, lodging for the night.

We were beginning to weary of the "everlasting hills" after having traversed several hundred miles of them. There was no object in making longer stages than we did, as we were now in communication with our Political Agent at Bamô, and had been informed of the date on which our escort of 300 British bayonets was due at Manwyne.

Next morning an unexpected steep had again to be surmounted. We reached the summit breathless and steaming with heat, though the temperature in the shade was only 64°; but we were rewarded by finding ourselves on a ridge, from which a magnificent prospect was obtained of the undulating ocean of hills on every side. The gradients on this route are often of the most exasperating steepness. The path seldom condescends to zigzag up a slope until it becomes absolutely impossible to ascend it otherwise; and the limit of possibility is so nearly touched in many places that the ascent has to be charged—taken with a rush—on pain of slipping back. Here and there, in a seemingly purposeless manner, the route descends from a ridge, runs a mile or two along a valley, and then appals the wayfarer by mounting again up the very same ridge. But there is a reason for this apparently eccentric deviation. The traffic must pass through the villages, and the villages must be situated near water; the road, therefore, adapted to these exigencies, dips on occasion to the bottom of the valleys.

The wide-spreading banyan trees which crowned the ridge we had attained formed a shady halting place, from which we watched our unfortunate coolies, burdened with some 70 lbs. weight, toiling with frequent pauses up the dusty slope, often sliding back, and gladly availing themselves of branches and shrubs as a *point d'appui*.

From this spot we descried a bright stream, large enough to be called a river, flowing down a valley on our north-west. This valley is said to produce much of the gold for which Yünnan is famous; but the whole district seemed to us almost uninhabited.

The route continues a short distance along the ridge, and then descends again through fine glades to the stream we crossed at starting. We run merrily down the slope to the hamlet of Niu-p'ing-pú (34¼ miles), and thence follow the stream until our path is barred by the river above mentioned. A large cotton caravan was waiting on the floor of the valley for more carriage. The first half of the cavalcade had just passed. The head of the leading mule was completely hidden in an elaborate ornament of coloured wool and silver buttons, and plumed with a *panache* of the tail feathers of the Amherst pheasant. All the succeeding animals we saw, some twenty in number, bore aigrettes of the same description. We encountered eight or ten caravans with the same insignia, and seeing that it takes several tails to form a plume, there must be good shooting somewhere. The whole turn-out was very well appointed, and caparisoned with a luxury far beyond the requirements of the route.

The swagger of the well-dressed and well-fed muleteers was also new to us, and new it seemed to them to have to yield the crown of the causeway to outlandish foreigners, who they found could on occasion assume the devil-may-care swashbuckler as well as themselves.

The trade of this region, chiefly cotton and opium, is almost monopolised by two merchant princes—Yang, the Generalissimo of Western Yünnan, and his Majesty the King of Burma. The former appears to take the lion's share, and it was one of his caravans that had just passed. His conductors, disbanded braves, notorious for their high-handed conduct, are the dread of the inoffensive villagers, and no one ventures to deprecate their exactions.

The Generalissimo himself enjoys a reputation of no common order; but as he was courteous and even hospitable to ourselves, it may be well to give him the benefit of the doubt, and to assume that scandal has exaggerated his failings in crediting him with all the qualities of Barabbas and Blue Beard. He is beyond doubt the richest and most influential man in Yünnan, and if the province is opened to trade, we shall probably have close relations with him. Shanghai was favoured by a visit from him two years ago, when he did us the honour to abduct a native damsel from our midst, and escaped his pursuers by the unromantic but simple device of hiring an omnibus.

A sudden turn to the right brought us to a very dilapidated suspension bridge (36½ miles) over the river, an insignificant stream easily forded during winter, but as the bridge indicates, swelling to an imposing volume at other seasons. The Shan-pi, as it is locally called, will not be discovered on any map. It was at the time we passed it the clearest of streams, about 30 yards broad, flowing with an easy current in a gravelly bed from the heart of the hills. A well-made road coasted its right bank, and as good roads are not made without some extraordinary reason in China generally, still less in Yünnan, I ascended it for a short distance, but without meeting a single person or habitation. We were told that the road was for the convenience of gold-diggers; the future traveller, with more time at his disposal, may decide the question. At many points of our journey, and notably in this neighbourhood, we lamented our inability to remain a few days and explore its attractive recesses. The natural charm of these glens is heightened by the fact that their secrets are unknown except to their own sphere of population. We follow the right bank at some elevation above the stream, and enter a curiously labyrinthine region, in which the river abruptly doubles back round a narrow peninsula of hill and then disappears into a very mountainous country on its way, no doubt, to the Mekong. After descending into a deep and dangerous hollow, apparently the bed of an ancient lake, we again mount up to the road which makes a detour round the chasm, and soon reach Huan-lien-pú (38¾ miles), a poverty-stricken and half-ruined hamlet.

The next day, 20th April, is again one of the severe hill work. A gully down which a small stream trickles to the Shan-pi is first crossed, and then a most formidable hill, "Chiao-kou-shan," temple-crowned and grove-clad, so steep as to be inaccessible from the eastern side, has to be worked round and taken in reverse. The road then follows a ridge between two deep valleys and becomes easier, still, however, rising. We pass the two hovels, which are called Pai-tú-pú (43¼ miles), and the ruined temple of Wan-sung-an (45¼ miles), and at Tien-ching-pú (47 miles), when we stop for the night we have reached an elevation of 8600 feet, being 3300 feet above the level we quitted in the morning.

The converse descent had to be accomplished next day; the western slope becoming gradually less wooded and at last completely bare. This condition is generally noticeable beyond Tali, and may perhaps be attributed to the influence of the winter winds which seldom vary more than from west to south-west. We were still traversing the

same almost deserted region. A moderately easy path led us through Sha-sung-shao (48¾ miles), a hamlet of five huts, Mei-hua-pu (50¾ miles), consisting of a couple of huts, and we halted at midday in one of the two sidings which constitute Ping-man-shao. The hill-sides at this point are dry and sandy, but there is no lack of water in the courses. The contrast between the eastern and western slopes is very striking.

Descending a rough and fissured ravine, we issued on to the plain of Yung-p'ing, which does not exceed three miles in breadth, and is perhaps nine miles long. It is to all appearance abruptly closed in at both ends, but there is probably an exit towards the south along the stream, which disappears through a pass in that direction.

The city of Yung-p'ing was dimly discernible through the haze at about three miles' distance. It seemed of small extent, and we were told that the slight importance it possesses is rapidly yielding to the large village of Ch'ü-tung at the southern end of the valley. The chief authority of Yung-p'ing, a magistrate, is generally to be found at Ch'ü-tung. Besides these two places, four or five hamlets, mostly in ruins, dot the plain, of which certainly not more than half is under cultivation.

The neighbourhood of Ch'ü-tung (58½ miles) is a little better than a marsh, through which flows the stream above mentioned, some 12 yards broad, and where we forded it scarcely a foot deep. It no doubt enters the Mekong, receiving on its way many accretions, one of which runs through Ch'ü-tung.

A little beyond the ford we encountered a pitiful indication of the misery which Tartar misrule and Mohammedan rebellion have brought upon the country. By the path-side were kneeling in a row some thirty women, with hands clasped in supplication of ourselves. Our first impression was that they were beggars, but it is doubtful if a beggar could exist in these deserted mountains and desolate vales. These women were, besides, comfortably dressed, though rather in the costume of the Tai (Shan) race beyond Têng-yueh than *à la Chinoise*. Their greeting—"A respectful welcome, great Sirs"—was no more than the usual formula. On inquiry it turned out that they were begging to be protected from the approach of beggary, and not to be relieved from its actuality. They were the women-folk of well-to-do Mohammedans slain during the outbreak, or missing; they still retained the ancient title-deeds of their lands and houses, but had been deprived of civil rights. Mistaking us for Mohammedans—a very frequent error—and hearing that we were officials on an important mission, they awaited our arrival to implore, in their ignorance, an intercession which, coming from us, would certainly have injured their cause.

Indications are not wanting to show that Mohammedan influence is far from extinct in Yünnan. These women are furnished with money by their refugee relations, who keep up communication with them from regions inaccessible to the authorities. At any moment imperial tyranny and fatuity may provoke an outbreak, and with so many wrongs to revenge and rights to recover, it may be imagined if the late masters of the country are likely to seize the occasion.

Ch'ü-tung is remarkable in our memory for four points: for its cleanly appearance; for its battered condition, three-parts of the place being covered by the ruins of substantial buildings; for the great number of small birds which frequent it; and for the capture, at which we were present, of a large snake in the very centre of the little town. It proved to be a jungle cobra 8 feet 1 inch in length.

On the morrow the inevitable climb awaited us. A winding track leads through a wooded glen to the foot of a steep ridge, which we only surmounted to find a most forbidding range still barring our advance.

Descending to T'ieh-ch'ang (62½ miles), which means "ironworks," but contains neither works nor iron, being nothing but a squalid gathering of half-a-dozen huts,

we found ourselves near the centre of a cultivated hollow; the stream which drains it seems to flow inexplicably into a bay of hills, without any exit—another enigma to be solved by the traveller of the future.*

Hsiao-hua-ch'iao (63¼ miles) ("little flower bridge") is not much more flourishing, but Hua-ch'iao, a mile further on, is a village of some pretension and preservation, a short distance up the slope. From about this point a continuous steep ascent winds among rocks and knolls through thick woods and thicker jungle, which obstruct the view in such a manner as to render bearings and distances problematical. Sixty-three minutes' severe labour, not including stoppages, brought us to T'ien-ching-p'u (66¼ miles), which is little more than a wayside hostel. We saw here for the first time some women of the race or races called indifferently by the Chinese "Ichia," "Mantzu," "Miao-tzu," or "Yeh-jen." The first term is perhaps less contemptuous than the rest; but they all mean, more or less, "savage," or "barbarian." Except in the case of the Kutung men, we never found the Chinese, official or otherwise, distinguish the different designations in the slightest degree, although there are obvious differences of language, dress, and manners. This was the more disappointing, as we were ourselves sometimes included in this indiscriminating category.

These women were dressed in ordinary blue cotton cloth, but were tricked out with a good deal of bead-work, especially about their head-gear. We had little time to improve their acquaintance, and as they could not understand us, nor we them, our conversation flagged. Though inclined to dumpiness, and of a brick-red complexion, their appearance was pleasing, nor were they by any means obtrusively shy.

While scrambling up the steep beyond this I overtook a caravan conducted by a few Kutung men. The first I passed was a youngster some seventeen years of age, handsomely dressed in a close-fitting woollen costume, and wearing a fine pair of sapphire earrings. My curiosity (not cupidity, as my companions, who were on ahead at the time, subsequently insinuated) induced me to ask him to allow me to examine them, and as it appears that he did not understand Chinese, I held out a hand with a gesture to the same effect. His only reply was to spring back and draw a long dagger from his belt. Not caring to risk my invaluable existence, nor feeling anxious to imperil his, I thought the best thing was to sit quietly down and make a polite gesture for an examination of his dagger. This policy seemed to puzzle him, and his excitement was already subsiding when five or six of our following, who all carried arms, came up and surrounded him. "Shall we incision make? shall we imbrue?" seemed the question of the moment; but on being told to sit down they at once obeyed, sitting round him where they had stood in a ring. This was too ludicrous a situation for the Chinese, who burst out laughing; but the young gallant, in a very dignified manner, stepped out of the circle and stalked away with his bare blade. His manner was not in the least like that of a savage, and though his action was hasty, I am not prepared to call it altogether unjustifiable.

Shortly afterwards, as I was endeavouring to find out from our Chinese what country these people inhabit, another of them suddenly issued from the jungle where he seemed to have been sleeping; but for some unexplained reason he had stripped himself stark naked, and was so evidently anxious to go back for his clothes that it would have been cruel to detain him. On continuing the route we passed a third

* On referring to the route chart it seems probable that the stream in question finds exit through a gap which was not visible from the road, and is the same brook that runs through Ch'ü-tung. We failed, however, to detect any appearance of such a break from Hua-di'iao, or a little before it, where we rested for some minutes.

who, though doubtless anxious to converse, turned out to be dumb. He seemed to be a servant of the others.

After tiffin, which welcome event took place at Yung-kuo-ssu (67¼ miles), a hamlet consisting of two huts, while we were attempting to enjoy a pipe of the mundungus, which in these regions passes for tobacco, the whole caravan came up. We sent to ask the chief conductor to visit our shanty; he accepted *sans gêne*, and after a mutual drinking of healths, in which process he exhibited a certain alacrity, we inquired the whereabouts of his country. With the little Chinese he spoke we only understood that his native place was somewhere north of Tali-fu. He was very well behaved, and by no means a bore, very much less so than the Chinese, who seldom perceive when the time has come to terminate a visit.

The breech-loading and extracting apparatus of a Snider rifle inspired him with so lively an interest, that in return for our allowing him, to the imminent danger of the public, to discharge ten rounds of ball-cartridge in various directions, mostly vertical, he insisted upon fetching his own matchlock, and exhibiting his and its powers of shooting. He returned with a fine old crusted weapon of the Chinese order, provided with a forked rest, and selected a white stone about seven inches in diameter, which he placed at a distance of 30 yards.

Lying down on his stomach and adjusting his rest, he took a prolonged aim and then pulled the match, previously lighted, slowly and carefully down upon the touch-hole. Nothing of importance resulting, he pricked up the powder and recommenced; still nothing worthy of note ensued, but not at all disconcerted, he rose with the remark that his gun had not gone off, that the match was probably damp, and he would fetch another. Thus reinforced, he contrived to hit the stone, and we warmly congratulated him on the achievement. His matchlock was furnished with a ring sight near the lock, but had no fore sight. The bullets were cylindrical.

As we were now on the best of terms, I inquired why his young compatriot had drawn upon me. He explained, much to the delight of my companions, that he was anxious about his earrings; but he was kind enough to exonerate me from any propensity to brigandage, and subsequently rebuked the young fellow roundly. The latter was told to hand me his dagger for inspection, which he did with a good grace, but I remarked that with pardonable circumspection he had divested himself of his earrings.

In the afternoon we descended to the valley of Sha-yang, a stony, half-cultivated hollow a mile and a half broad, and stretching, as far as we could judge, about four miles to the south-east. That it cannot extend far is shown by its stream running north-west, in contradiction to the general conditions of this water system. The stream must enter the Mekong, and from the direction of the mountains we feel safe in assuring our successors that by following its course for a few miles they will discover gorges and defiles of unusual abruptness.

We had undergone a hard day's work, and took advantage of our arrival at a spacious temple to rest for a day. Ten miles per diem may seem a small matter to the British tourist, but if he will make the experiment of emptying the contents of his dust-bin down his backstairs, turning on all the water-cocks, and sprinkling a cartload of bricks over the whole, he may, by marching up and down until he has completed 10 miles, arrive at an approximate conception of a day's journey in Western Yünnan.

Our coolies were delighted with the prospect of a day's repose, and so seemed the willing mules and ponies—"the hollow pampered jades of Asia, that cannot travel thirty miles a day." Our jades were more hollow than pampered. They were generally left to find their provender on the hill-side. The ponies are wonderful animals, absurdly small, but of surprising pluck and pertinacity.

The temple is situated on a hill-slope above the village of Sha-yang. It will form very agreeable head-quarters for travellers who intend to examine this section of the Mekong Valley, but it will be advisable for them to occupy the hall in which the idols are installed in preference to the lodging rooms. These are low and thinly roofed, and one of our party who slept in them suffered from a severe access of fever. The terrace of the temple is shaded by fine trees, and on the hills at the back, hog, deer, and partridges may be found without too much exertion. Our sportsmen found it best to mount a commanding point and shoot down. In the event of the larder failing, those who consider doves worth eating will make a plentiful bag.

Sha-yang, or Sha-mu-ho, a little below our temple, is a village of some importance. A fair was being held there, to which our Kutung friends had brought a stock of peddling. We tried in vain to induce them to part with their swords and daggers, some of which were handsomely ornamented with silver.

Although now less than three miles distant from the Mekong, we could form no idea of its course; the abrupt wall of hills facing us seemed the introduction to another mountain journey of 10 or 12 miles; but on the 24th, after passing through Sha-yang and Yung-fêng-chuang (74 miles), the latter a small but well-to-do village, a steep climb of twenty-five minutes suddenly brought us on to a ridge almost vertically above that famous river. A series of short and dangerous zigzags leads down to a bold suspension bridge of 60 yards span, striding the river at its issue from the darkest of gorges. The perpendicular walls are not 100 yards apart; from our confined position we did not venture to estimate their height. The heath-clad domes which surmount them towered far above us while we were still on the ridge. A narrow road which crowns the right bank leads invitingly into the gulf, but we were compelled to turn reluctantly away.

The Mekong is 60 yards broad at this point, but it widens below to about 80. The reach seen by us is a smooth, steady stream, without rapids, the current scarcely more than 2½ miles, and probably, though this is a mere estimate, affording 10 feet of water. We could only see about four miles down the stream; at that distance it disappeared from view between precipitous barren walls; the whole reach was, in fact, nothing but a floor of the gorge. On the left bank the mountains rose immediately from the margin of the water, but on the right there was an occasional shingle bed. The 'Yünnan Topography,' a Chinese work published under the Ming dynasty, remarks, "The Lan-tsang river (Mekong) 80 *li* north of Yung-ch'ang at the base of the Lo-min Mountains, is 90 yards in breadth; its depth has not been ascertained. Flowing by Yung-lung and Shun-ning, it passes through Ch'e-li, and enters the Southern Ocean."

The height of the Mekong above the sea-level is about 4700 feet. We make no doubt that it is at this point capable of boat navigation, but there is no trade, nor any town to trade to. At the time of our visit it was swollen by rains; and it is noteworthy that the Salwen and Shweli, which we afterwards crossed, were not in the least discoloured, although the rains had by that time fairly begun. We saw no boats on the river, nor, indeed, anywhere after leaving the lake of Tali-fu. There seems to be no trade from north to south; we passed very few paths running in that direction, certainly nothing worth the name of road. This fine stream, instead of affording an easy highway for traffic, forms an obstacle to communication. "Lan-tsang-chiang" is the received native name of the Mekong, but it is generally abbreviated into "Lan-chiang."

The three main streams of Western Yünnan are locally known by the convenient terms Lan, Lu, and Lung.

The suspension bridges, which are the pride of Yünnan, are all constructed on the same system; five or more chains formed of oval links about six inches in the long

diameter, and ¾-inch thickness, are strained very tightly across, the ends being embedded in rock or masonry, but how secured did not appear. The way consists of planks laid on these, not suspended from them, and two other chains hung from massive gatehouses at both ends form a protection and assistance to the passenger. In some cases the road chains are tied with bars. The bridges vibrate considerably, but the curve is not very great. It would be interesting to ascertain how, with their miserable appliances, the Chinese contrive to stretch the chain so tightly, decreasing the strength of the bridge while rendering it easier to cross. We saw no instance of the roadway being suspended from the chains.

We were now on the border-line between Carajan and Zardandan: "when you have travelled five days you find a province called Zardandan," says Messer Marco, precisely the actual number of stages from Tali-fu to the present boundary of Yung-ch'ang. That this river must have been the demarcation between the two provinces is obvious; one glance into that deep rift, the only exit from which is by painful worked artificial zigzags which, under the most favourable conditions, cannot be called safe, will satisfy the most sceptical geographer. The exact statement of distance is a proof that Marco entered the territory of Yung-ch'ang.

P'ing-p'o (76 miles), a hamlet about a mile beyond the bridge, is also called Lan-tsang P'ing-p'o ("Mekong terrace"). The bluffs above it seemed utterly inaccessible; but a rough and slippery way, in many places cut in the rock, climbs the almost vertical cliff, and after a parting gaze at the great river we threaded a narrow valley between low heights and reached Shui-chai (77¾ miles), our resting-place for the night, a well-built and populous village, perched in a small amphitheatre amid grassy hills. There is a good deal of cultivation, chiefly rice and poppy, in the neighbourhood.

Next day, April 25th, the first of the spring rains came upon us. We followed a very devious path, above a small cultivated valley, and not long after starting, espied in a south-east direction, two stupendous crags of bare rock. Unfortunately they were soon hidden from our view by rain clouds and intervening hills, and I had no opportunity of fixing their position. They seemed less than four miles distant, and probably overhang the Mekong. Black, jagged, and utterly bare, they are in strange contrast with the rounded and verdant summits which they dominate. All the faces visible to us were precipices, apparently 1000 feet sheer, but we could not see their bases. If they overhang the river, the view from its gorge must be of unusual sublimity.

A dense rain-cloud suddenly burst over us, and in a very few moments our whole party—some twenty-five in number, not including escorts and muleteers, who had not yet come up—were as thoroughly wet through as if they had just swum the Mekong. The hamlet of Tali-shao (80½ miles) afforded us temporary shelter, but after quitting it, which we did rather prematurely, we had to encounter the full force of the deluge for forty-two minutes.

One of us, profiting by his experience of rain storms in Formosa, took off all his upper garments, rolled them up as tightly as possible, and, pressing them under his arm, made all haste onwards.

The narrow and confined track soon became a running stream nearly a foot deep, and boots and socks had to be dispensed with. One of our party, with that readiness of resource so characteristic of distinguished travellers, effected a rush up a slope of red clay, with a view to outflank the torrent; but after a successful ascent of 40 yards, he found it impossible to proceed or return, or even to retain a standing position. The sudden *glissade* which he was compelled to execute, plunging with great accuracy and splash into the deepest part of the flood, was inspected with minute curiosity by his companions.

A mile and a half of similar scrapes brought us to the village of T'ien-ching, which boasts half a hut and a floating population of three. The fragment of a hovel was little better than a lean-to, composed of two walls and a crazy reed roof. Our whole party huddled into it, and proceeded to wring out their clothes. Those who had taken the precaution of rolling them up found the inmost convolutions almost dry, but the rest had to endure chills and cramps for the space of a couple of hours. We had prudently carried with us a light iron stove, and were all rewarded by its usefulness in this washed-out hovel, where there was no fire-hole sufficient even for the simple requirements of a Chinese cook.

During the spring rains, which begin in May and fall more or less continuously for about two months, the traffic of Western Yünnan almost ceases. Even on the level road we had found progression barely possible; what it must be on the steep slopes and zigzags I would rather imagine than experience. The coolies tie iron "crampons" to their straw sandals, and we found the latter preferable in many cases to the heavy and slippery European boot.

The sun broke through again, and we strolled pleasantly down a dell by a rushing stream, past the two huts of Niu-chio-kuan (83 miles), to the village of Kuan-pó (84 miles), which overlooks the large valley of Yung ch'ang, "at the close of the eve, when the hamlet was still." We sauntered about the place to pick up scraps of information, and met two traders who had just returned from Manwyne, where they had been trading profitably with a venture of Yünnan opium. They considered the route which lay before us fairly easy as far as Manwyne, with the exception of the two days' journey beyond the Salwen; we should find this the most toilsome ascent of our whole journey. We must not fail, they said, to cross the Salwen and its valley before sunrise, or we should inevitably succumb to malarious fever.

The mountain road beyond the farther bank was difficult and wearisome in the extreme, and in addition to ordinary dangers from brigands, an attack was to be apprehended from a band headed by a certain Li-ch'ao, sometime a Mohammedan partisan, who had lately taken to the mountain and declared war to the knife against Imperial officialdom.

This person was seconded by a trusty ally, carrying on concerted operations farther west, in the shape of a priest endowed with miraculous powers to exterminate the unregenerate by spells and exorcisms. The Tai (Shan) people beyond T'êng-yueh were, they informed us, very genial and hospitable.

The Yung-ch'ang Plain, which we entered next day (April 26th), is the most extensive we had seen since leaving the capital. Here alone did we meet any signs of the great population which common report has attributed to Yünnan before the Mohammedan troubles.

A level plain, some six miles in breadth, stretched north and south for a distance of 20 or more miles, teeming with villages and seamed over most of its extent with the demarcations of rice-fields—a joyous prospect, at first sight, of prosperity and peace; but descending into its midst, we found its habitations generally a heap of crumbling and deserted ruins, and the fields for the most part a malarious morass. The village of Pan-ch'iao (88½ miles) had retained certain vestiges of population and trade, to be accounted for by its advantageous situation on the central stream, making the irrigation of its vicinity more convenient than elsewhere, and by the fact that the causeway which supports the high road passes through it. We traversed its one long street on a market morning; but with the exception of a few stalls of crockery, iron pans, hoes, and nails, little more was displayed for sale than the pigs and agricultural produce of the neighbourhood.

Its stream, crossed by a stone bridge, which gives it the name Pan-ch'iao (slab

bridge), is about 20 feet broad and of insignificant depth. On most maps a large lake is depicted south of this point. It may once have existed; the plain is very marshy, though the borders of former rice-fields can everywhere be distinguished, and is impassable except along the paved causeway leading to Yung-ch'ang, but there is at present no body of water which could even be mistaken for a lake.

Yung-ch'ang, the westernmost prefectural city (*Fu*) of China, is visible from a long distance, being partly built on a spur of the Western range. From the north-east this spur has the appearance of an artificial pyramid raised behind the city, an illusion which is heightened by a part of the wall running up from the angle. A cluster of temples and pagodas some little distance up the height give the place an imposing appearance; but more than half the space within the city walls consists of waste land, supporting a flourishing population of pheasants. The plain is about 1200 feet lower than that of Tali, being 5880 feet above the sea-level.

A word regarding the dialect of Yünnan. The farther we advanced towards the west, the purer we found the language. Any one who possesses a moderate knowledge of the so-called "Mandarin" colloquial will be charmed with his intelligibility in Yünnan. Yung-ch'ang is specially distinguished for the clearness of its pronunciation, approximating to the Peking dialect, but devoid of most of the vulgar and superfluous *r* final. Things have indeed changed since Marco's time, when the people "had a language of their own, which is passing hard to understand."

How comes it that the language of the remotest province of China is almost identical with that spoken at the capital, while in the intervening provinces so many uncouth and distorted jargons are encountered?

The patois of Ssŭ-ch'uan, at any rate in the mouths of its country folk, was more than half unintelligible to our northern followers. Hunan was, in addition, ridiculous; but in Western Yünnan we were accosted in a familiar and luminous speech, which made us feel as if we were nearing home. Philologers would fail to discover the reason, independently of history, but it is of infinite simplicity. The natives of Yünnan were forced to learn the language of the north on pain of death.

Wu San-kuei, the Chinese general who sided with the Tartars at the rise of the present dynasty, and subsequently reduced Yünnan, became its king, and imposed a despotic and grammatical rule upon his subjects. Selecting those of his veterans who spoke the purest Chinese, he set them to instruct the vanquished. Tradition does not state how many dunces were decapitated, but in any case his educational policy has produced admirable results. "At times kings are not more imperative than rhymes." But here was a king more imperative than a whole language.

Biot has it that Yung-ch'ang was first established by the Mings, long subsequent to the time of Marco's visit, but the name was well known much earlier. The mention by Marco of the Plain of Vochan (Unciam would be a perfect reading), as if it were a plain *par excellence*, is strikingly consistent with the position of the city on the verge of the largest plain west of Yünnan-fu. Hereabouts was fought the great battle between the "valiant soldier and excellent captain Nescradin," with his 12,000 well-mounted Tartars, against the King of Burmah and a large army, whose strength lay in 2000 elephants, on each of which was set a tower of timber full of well-armed fighting men.

There is no reason to suppose this "dire and parlous fight" to be mythical, apart from the consistency of annals adduced by Colonel Yule; the local details of the narrative, particularly the prominent importance of the wood as an element of the Tartar success, are convincing. It seems to have been the first occasion on which the Mongols engaged a large body of elephants, and this, no doubt, made the victory memorable.

Marco informs us that "from this time forth the Great Khan began to keep

numbers of elephants." It is obvious that cavalry could not manœuvre in a morass such as fronts the city. Let us refer to the account of the battle.

"The Great Khan's host was at Yung-ch'ang, from which they advanced into the plain, and there waited to give battle. This they did through the good judgment of the captain, for hard by that plain was a great wood thick with trees." The general's purpose was more probably to occupy the dry undulating slopes near the south end of the valley. An advance of about five miles would have brought him to that position. The statement that "the King's army arrived in the plain, and was within a mile of the enemy," would then accord perfectly with the conditions of the ground. The Burmese would have found themselves at about that distance from their foes as soon as they were fairly in the plain.

The trees "hard by the plain," to which the Tartars tied their horses, and in which the elephants were entangled, were in all probability in the corner below the "rolling hills" marked in the chart. Very few trees remain, but in any case the grove would long ago have been cut down by the Chinese, as everywhere on inhabited plains. A short distance up the hill, however, groves of exceptionally fine trees are passed. The army, as it seems to us, must have entered the plain from its southernmost point. The route by which we departed on our way to Burmah would be very embarrassing, though perhaps not utterly impossible, for so great a number of elephants.

Leaving Yung-ch'ang—in which city, by the way, we were not impressed by the truth of Colonel Yule's encomium on "the remarkable beauty and fairness of the women"—we started down the plain in full view of the great battle-ground, through fields purple and white with the curse of China, over a bridge which spans a dry watercourse, past a large reservoir for irrigation, and then rested at Wo-shih-wo, the "Den of the Sleeping Lion" (96½ miles), a poor hamlet. From this we immediately entered the hills, and a short ascent brought us to the mouth of a cave from which the hamlet derives its name. This cave possesses great local celebrity as a curiosity. The peculiar name does not appear to be connected with any tradition. According to the topographical work quoted above, "the cave is situated at the foot of Sleeping Lion Hill, and is called Banana Cave; it is two fathoms broad, the same in height, and penetrates the mountain a distance of 150 paces. The glittering stalactites within resemble lilies, bells, and umbrellas."

A further ascent brought us to Kao-tzu-p'u (98½ miles), and in the afternoon we loitered through a pleasant upland, thick with fine trees and shrubberies, until, after extricating ourselves from the dark and forest-hidden dell of Lêng-shui-ching, we issued on to the usual barren western slope, and descended by a very winding path to P'u-p'iao (106½ miles), situated in a small circular valley amid fields of rice and poppy. Good lodging can be obtained in a temple a quarter of a mile beyond the village.

General Thunder came in the evening with an anxious countenance to inform us that the rebel Li-ch'ao was encamped on the hill-side a few miles beyond. Li-ch'ao had played a conspicuous part in the Mohammedan rebellion, but, on its suppression, had tendered his submission. While living quietly on his farm he had been sued for a debt equivalent to about 65*l.*; this he paid, but shortly afterwards was again sued for the same debt, the authorities affirming that he had not paid it. When he protested against this extortionate tyranny, he was refused a hearing as being a notorious rebel. He once more paid the money, but when an attempt was made to obtain a third exaction by the same tactics, he was driven to a fit of desperation, such as not seldom seize the Chinese. He proceeded to murder his mother, wife, and children, burned his house, then took to the hills with a band of followers, many of whom, like himself, had been persecuted to desperation, and swore death to all officials on whom he could lay hands.

We had personally, in all probability, no cause to apprehend the animosity of this desperado; moreover, there is reason to think that the authorities contrived to make some arrangement with him, or with his followers, not to molest us. Our *impedimenta*, too, reduced by this time to a few cans of tinned soups, garrisoned as they were by a still plentiful supply of ball and shot-cartridge, would scarcely have tempted the most rapacious freebooter. So we comforted Thunder by assuring him that not having the honour to be Chinese officials, we felt perfectly secure; at the same time we earnestly pressed him to take the greatest care of his own safety.

The little valley in which P'u-p'iao is ensconced bears every trace of having at an earlier period formed the bed of a lake. It was, doubtless, ultimately drained by the action of its small stream cutting deeper and deeper into the natural bound, at one time a bar, which bounds it on the north-west.

The next day, April 29, we did not get under way until the afternoon. We were beginning to feel affected by a certain weakness, lassitude, or laziness—I know not which to call it—(feverishness, would, I think, be the aptest term), brought on possibly by the extreme dryness of the air. Here, as during the whole journey, the Chinese suffered much more than ourselves. This exceeding dryness was proved, in the absence of instruments, by the rapidity with which our water-bottles—ordinary claret bottles, wrapped in wetted flannel—were cooled by evaporation. On the whole land-route from the Yang-tze to the Shweli, we easily obtained deliciously cool water by this means; but after descending into the sweltering valleys beyond T'êng-yueh, we were much surprised and inconvenienced by the invariable failure of the process.

In this condition our plentiful supply of quinine was an invaluable boon; our whole medical practice was, indeed, very successful, except in the case of our poor native writer, who died very suddenly soon after leaving the Yang-tze. I have my own suspicion of the causes of his death, but it would be out of place to relate them here. If we ever erred, which we do not admit, in the matter of prescriptions, it was on the side of excess; but the fine air, and the high spirits of the whole party, by no means excepting our Chinese, contributed no doubt to nullify the inconvenience of ears buzzing with quinine, sore eyes obscured with acid lotions, and skins scarified with undiluted disinfectant fluids.

On one occasion we found that a large bottle of carbolic acid had been broken inside its wooden case. We exhausted our ingenuity in hopeless efforts to unscrew the cover. We feared to carry it farther, as the burning tears distilled by it destroyed everything they touched. We dared not throw it aside, lest the unsophisticated heathen should drink it as a cheering or medicinal beverage. We had no time to wait and empty it, as the fatal fluid would only trickle drop by drop through a chink which had been cautiously and laboriously excavated with a blunt hunting-knife.

What were we to do? Degrading as the confession must appear, we had to deposit the torpedo in the middle of the yard, and throw bricks until it was smashed.

From P'u-p'iao the road turns the hills by deviating to the north-west, following the direction of the stream.

We lost sight of this in a deep nullah, and, after travelling three and a half miles, we sat down on the terrace of a ruined temple, overlooking a small but populous and thickly-cultivated amphitheatre, through which the stream meanders, and at last disappears to the north among low hills. We were told that it shortly afterwards enters a lake about 10 miles in circumference. There was certainly an appearance of a depression in that direction, and a lake is indicated on some maps with the name Chien-Hai-tzu.

While we were reposing at the temple, Thunder came up, and pointing to the opposite mountain-side, informed us that we could now see the rebel band with our own eyes. We certainly made out a small dark mass high up the barren slope, but, for all we could discern, it might as well have been a flock of goats. The smoke which issued from its midst, however, corroborated the general testimony, and somewhat blunted our scepticism. We were never gratified with a sight, however distant, of the wizard priest; but, as will be seen in the sequel, he has contrived to make his mark in the annals of Yünnan.

Our party consisted of no small number. The escort provided by the Governor of the province was nominally sixty all told, but it dwindled occasionally to twenty, or less. At this point it was doubled.

We had ourselves recruited a few Ssŭ-ch'uan braves for our personal escort, and very faithful and attentive henchmen they proved themselves. Our cook was generally despatched at dawn with careful instructions, designating the exact locality for tiffin. Then would follow the coolies and mules with our cumbrous *impedimenta* galling their reluctant backs. About seven o'clock our vanguard would set out, consisting of some ten tall fellows waving immense spear-topped banners, followed by as many malignant and turbaned braves armed to the teeth, with opium-pipes and umbrellas. Then came ourselves, brandishing mysterious weapons known to the barbarian as prismatic compass and field-glass, and attended close at heel by followers bearing the fallible rifle and the devious shot-gun. Our servants, mounted on destriers, 10 hands high, brought up the rear, in company with sedan chairs, water-bottles, medicine-chest, more escort, and the less efficient coolies, among whom we occasionally discovered a literary student, who took unnecessary pains to assure us that his studies had prejudiced his muscularity. In this rough country the sedan-bearers are assisted by traces made fast to the two poles; a dozen trackers haul upon these, leaving to the bearers little more than the task of supporting the chair.

A kind of *corvée* is in force, by which the villagers are bound to provide trackers for official travellers; the consequence is that young children, naked little rascals, sometimes not more than eight or ten years of age, generally present themselves, willing, and even anxious, to strain at the traces over 15 miles of rock and mire, and the moment they have reached the end of the stages and unharnessed themselves, to hasten back again, by night, through the dark forest, to their mothers with a day's pay of about three farthings.

The little wretches carry their own provisions in the shape of a scanty bag of boiled rice. We never used our chairs except when required to do so by etiquette, as on entering the gate of a town; but it was useless to protest that we had no need to be supplied every morning with a large family of small children; they invariably appeared soon after dawn, but after travelling a mile or two, we used to send the very young ones back with a few extra cash and a recommendation to go to school. It was piteous to see the astonishment with which they commonly regarded this outrageous irregularity.

Resuming our route, we rounded the end of the small western range, and turning south down a tranquil avenue of grassy hills abounding with francolin, soon arrived at the four hovels which shelter the inhabitants of Ta-pan-Ching (113½ miles). Fortunately for our numerous cavalcade, the house accommodation was reinforced by the erection of a few mat-sheds.

The morrow's journey would lead us across the Salwen—a river, to the native mind, teeming with portent and mystery. In Western Yünnan this river is always spoken of with a certain awe. Governor T'sen himself had warned us to cross its valley with all haste. Often had we been told of the many varieties of malarious

exhalations which shroud the hollow after sunrise: fogs, red, yellow, and blue, of which the red is the most deadly, and the blue next in the scale of mortality.

General Thunder, who had never previously crossed, came to notify to us that he had determined to start before daylight, so as to get well beyond the river before the sun was up. Luckily for us, he said, the deadly flood was now spanned by a suspension bridge, but before its construction travellers had to pass in boats. In those days a gruesome monster, resembling in shape a huge blanket, would issue from the depths, and wrapping passengers and boat in his fœtid folds, would sink back into his native abyss.

These dreadful stories, which I tell as they were told to us, so excited our curiosity, that we resolved to cross the valley of death at mid-day, and tiffin on the very verge of Styx.

On the next day, April 29, Thunder was up and away long before daylight. We started about seven o'clock down a steep gorge through dense woods, and soon discovered the valley of the Salwen far below us. Seven miles of continuous descent, alongside a stream which in some places selected the road as its bed, brought us to the mysterious river (121 miles), crossed by a chain-bridge 140 yards long and of two spans. One span of 80 yards clears the water, and the other bridges a shingle-bed, which is covered in the summer months. A massive rock-based pier on the edge of the bed supports the chains, but, curiously enough, the chains of one span are not continuous with those of the other; the ends of one set terminate in the pier, and the other set takes a fresh departure several feet to one side; so that on arriving at the pier the passenger has to turn at right angles to his course to attain the second span. The structure is, in fact, two suspension bridges. It is in a very dangerous state of dilapidation, and we hurried over it, not unmindful of the blanket-fiend lurking below.

The floor of this valley lies at the surprisingly low level of 2670 feet above the sea. The river is some 240 feet lower, running between steep banks of a regular slope, much resembling a huge railway cutting. It sweeps down a short rapid under the bridge; but farther down it was evidently of considerable depth, by no means swift, with a breadth of 90 yards or more, and invitingly navigable for boats of a large size—say, the boats of the Upper Yang-tze, but not a shallop or punt was to be seen.

The shingle-bed under the bridge was strewn with granite boulders glittering with unusually brilliant mica-flakes.

Just beyond the bridge was a small village, created no doubt by the slender traffic, where under a magnificent banyan we spread our frugal table. But even before leaving the bridge we met evidence of the plague which desolates this valley; for, sitting in the gateway was a young man whose corpse-like aspect at once drew our attention; his face was a greyish-black, and what should have been the whites of his eyes were literally and actually green. As we approached he slowly turned those horrible orbs upon us, with a dazed and other-world motion that was most ghastly. He was evidently in a severe stage of some form of fever. We administered a dose of quinine, which he swallowed without hesitation, and without interest. There were six other cases of the same sort in the village.

Many of the houses were merely skeletons of pole-work, of course unoccupied. We were told that in a few days the whole village would be dismantled, and the people would withdraw to the mountains.

We then discovered the strange fact that this valley is uninhabitable during the summer months on account of the malaria, the natives retiring as soon as the fields are planted, and returning to reap them in the autumn. "But what becomes of travellers?"—"Very few pass in the hot season, and those hurry through before

sunrise." There may be some exaggeration in this, but the main fact is unquestionable.

The air of the place was curiously hot; the thermometer, well shaded, stood at 96°, but irregular blasts were wafted from the south-east, which scorched like the breath of a furnace.

Walled in by precipitous mountains, and wooded with clumps of exceptionally fine trees, the unhappy valley is picturesque in the highest degree. Small rounded hills are dotted about its floor; the rice-fields cover a great space, but very few, probably not a tenth part, are now under cultivation. It is by far the lowest depression in Western Yünnan, and runs nearly due north and south as far as the eye can reach, with an average breadth of about two miles. Looking up that lone avenue of precipices, between which the deserted river threads its silent way, one cannot suppress a certain sentiment of solemnity.

A short distance below the bridge lies a considerable walled village, bearing the curious name, Old City of Tu-shu (Tu-shu las Ch'êng), inhabited by a people not Chinese, and governed, subject to Chinese supervision, by an official of their own race, as among the Tai tribes.

Although we had no opportunity of establishing the point, there is little doubt that these people are Tais, the same that are called "Shan" by the Burmese, and "Po-yi" (white barbarians) by the Chinese. Why not allow them to retain their own national designation of "Tai"? They preserve their own manners, costume, language, and alphabetic writing: let them keep their own name.

One would not have expected to find these interesting people so far east of T'êng-yueh. They also desert the valley in summer.

Of the three rivers, Mekong, Shweli, and Salwen, the Salwen is, in the parallel at which we crossed, beyond question the largest. The 'Topography of Yünnan' does not give its breadth, but draws special attention to its evil reputation for malaria: "The Lu river, anciently called the Nu, is met with 20 miles south of Yung-ch'ang. The mountains on both banks are exceedingly steep, and its exhalations are so poisonous that it is impassable during summer and autumn."

Another strange disease which haunts this and some other of the valleys of Yünnan bears, in some respects, a resemblance to the plague of London described by Defoe.

Its approach is indicated by the eruption of one or more minute red pustules, generally in the arm-pits, but occasionally in other glandular region. If several pustules appear, the disease is not considered so hopeless as when there are few. The sufferer is soon seized with extreme weakness, followed in a few hours by agonising aches in every part of the body; delirium shortly ensues, and in nine cases out of ten the result is fatal.

It often happens that the patient suddenly, to all appearance, recovers, leaves his bed, and affirms that, beyond a slight sensation of weakness, he feels thoroughly convalescent. This is invariably a fatal sign; in about two hours the aches return, and the sufferer dies.

True recovery is always very gradual. This is the account given us by a French missionary, who has spent half a lifetime in Yünnan. The native version includes all the above facts, but involves them in a cloud of superstitious accessories; for instance, all parts of the sick-room are occupied by devils; even the tables and mattresses writhe about and utter voices, and offer intelligible replies to any one who questions them.

Few, however, venture into the chamber. The missionary assured me that the patient is, in most cases, deserted like a leper, for fear of contagion. If an elder member of the family is attacked, the best attention he receives is to be placed in a

solitary room, with a vessel of water by his side. The door is secured, and a pole laid near it, with which twice a day the anxious relatives, cautiously peering in, poke and prod the sick person, to discover if he retains any symptoms of life.

Père Fenouil (there is no objection to his name being mentioned) had himself witnessed many cases of the disease, and lived in infected towns. He attributes his own safety to the precautions he took of fumigating his premises, and keeping charcoal braziers constantly burning, to such an extent, indeed, that his house on one occasion actually took fire. He states that not only human beings, but domestic animals, and even rats, are attacked by the pestilence.

Its approach may often be known from the extraordinary movements of the rats, who leave their holes and crevices, and issue on to the floors without a trace of their accustomed timidity, springing continually upwards from their hind legs as if they were trying to jump out of something. The rats fall dead, and then comes the turn of the poultry; after the poultry have succumbed, pigs, goats, ponies, and oxen successively die off.

The good father has a theory of his own that the plague is really a pestilential emanation slowly rising in an equable stratum from the ground, and as it increases in depth, all animals are, as it were, drowned in its poisonous flood—the smaller creatures being first engulfed, and man, the tallest of Yünnan animals, suffering last.

The Christian converts suffer less than their pagan countrymen, from the superior cleanliness which, as we were informed, their faith inculcates.

We ourselves never saw any cases of the plague; but we met one native of South-Western China, no less a personage than the Governor of the Yünnan province, T'sên, a quiet, sober-spoken veteran of a hundred battles, deeply marked between the eyes with a scar inflicted by a rebel bullet. He had undergone two attacks; the second was less violent than the first. He remembered nothing of the acute period of the illness, but in both cases his recovery was gradual and protracted.

He attributed it to the influence of demons; and we afterwards heard a characteristic instance of his faith in his own diagnosis. The headquarters of his division during the Mohammedan rebellion were situated in a plague-stricken town, and when the infection began to attack his troops, T'sên had all the gates closed except that in the southern wall, and then sent in his soldiers with orders to slash and pierce the air in every corner that could possibly harbour a demon. After this preliminary slaughter, the men were formed in line against the inside of the north wall, and gradually advanced upon the south gate, hemming in the invisible fiends, and ultimately driving them with a final rush through the gate, which was immediately closed, and a strong guard placed outside. But somehow or other the goblins contrived to regain the interior of the city; by what means has not been ascertained, but it is surmised that they climbed over the wall.

We have now some explanation of the evil repute borne by this valley; it is certainly pestilential. The river was, until a late period, the boundary of China, as is indicated by the existence of the "old city" on its opposite bank. Border regions, "debatable grounds," are notoriously the birthplaces of myths and marvels. We relegate these lone recesses to the future explorer.

On a post in the village were nailed the ears of a thief. Those dead ears seemed a fit symbol of the deathly silence which reigns over the plague-stricken hollow.

With a sense of relief we began to climb the Kao-li-kung range by an interminable series of steep but well-paved zigzags, which brought us, weary and feverish, to the hamlet of Ho-mu-shu (120 miles), 3000 feet above the valley. Near this we found repose in a tumble-down temple.

*May 1st.*—Up through thick forest we continued the ascent, the brave baggage-

mules struggling and staggering along with ill-rewarded pluck. We emerged on to a short ridge appropriately named "Elephant's Neck," Hsiang-po (127½ miles), on which were perched a few mat-sheds newly transported from below. On our left, looking towards the river, a deep and pathless gully, dark with pine and undergrowth, shot down to the plain, and all around nothing arrested the eye but a stray crag towering above the forest. Under a bush close to the hamlet lay the corpse of a murdered woman—murdered by a robber for the sake of a parcel which the victim was attempting to conceal in her bosom, and which turned out to contain nothing more valuable than a common opium pipe purchased by the poor creature for her son.

Still up through the forest we mounted, until, at an elevation of 8730 feet, we paused to admire the paradise of dense greenery which undulated below our feet. This was the highest pass we encountered in Western Yünnan. Poor Margary writes favourably of this region as compared with the "horrid passes" between Yünnan-fu and Tali; but in the matter of gradients and difficulties of route there is really little to choose between the two sections.

We feel at liberty to say that if British trade ever adopts this track, we shall be delighted and astounded in about equal proportions.

By a circuitous path more and more thickly overshadowed as we descended, Tai-p'ing-pu (131½ miles) was reached, a mere cluster of shanties surrounded by an impenetrable forest. I write "impenetrable" with complete confidence, as General Thunder had specially requested the Nimrod of our party to take him out for an evening's shooting at this point. Thunder was held fast by his petticoats in a thorn-bush within 30 yards of the road, and did not attempt further exploration. "Dinah," our unfaithful retriever, sat down in a comfortable spot, and declined to interest herself in the operations; and Nimrod himself, after worming his way like the veriest Mohican a few yards farther, just managed to obtain a snap shot at the hind-quarters of a small deer, which did not remain long enough to allow its injuries to be substantiated.

To return to Marco Polo. The generally received theory that "the great descent which leads towards the Kingdom of Mien," on which "you ride for two days and a half continually downhill," was the route from Yung-ch'ang to T'êng-yueh, must be at once abandoned. Marco was no doubt speaking from hearsay, or rather, from a recollection of hearsay, as it does not appear that he possessed any notes; but there is good reason for supposing that he had personally visited Yung-ch'ang. Weary of the interminable mountain-paths, and encumbered with much baggage—for a magnate of Marco's court influence could never, in the East, have travelled without a considerable state—impeded, in addition, by a certain quantity of merchandise, for he was "discreet and prudent in every way," he would have listened longingly to the report of an easy ride of two and a half days downhill, and would never have forgotten it. That such a route exists I am well satisfied. Where is it? The stream which drains the Yung-ch'ang plain communicates with the Salwen by a river called the "Nan-tien," not to be confounded with the "Nan-ting," about 45 miles south of that city, a fair journey of two and a half days. Knowing, as we now do, that it must descend some 3500 feet in that distance, does it not seem reasonable to suppose that the valley of this rivulet is the route alluded to? The great battle on the Yung-ch'ang plain, moreover, was fought only a few years before Marco's visit, and seeing that the king and his host of elephants in all probability entered the valley from the south, travellers to Burma would naturally have quitted it by the same route.

But again, our mediæval Herodotus reports that "the country is wild and hard of access, full of great woods and mountains which 'tis impossible to pass, the

air is so impure and unwholesome; and any foreigners attempting it would die for certain."

This is exactly and literally the description given us of the district in which we crossed the Salwen.

To insist on the theory of the descent by this route is to make the traveller ride downhill, "over mountains it is impossible to pass."

The fifteen days' subsequent journey described by Marco need not present much difficulty. The distance from the junction of the Nan-tien with the Salwen to the capital of Burma (Pagan) would be something over 300 miles; fifteen days seems a fair estimate for the distance, seeing that a great part of the journey would doubtless be by boat.

But we must continue our route.

We passed the night at T'ai-ping-pu in a hovel belonging to a Mohammedan family, who imagined us, as was often the case, to be co-religionists. Our host, for fear of heretic persecution, did not care to confess his faith, but the woman made very little scruple of speaking out. Our carriers and escort, having no shelter, managed to bivouac comfortably round huge fires of "good sappy bavins," furnished by the primeval forest which hemmed us in. As we descended on the 2nd May, the woods gradually thinned, and we very soon came in sight of the Shweli river, named "Lung-ch'uan," or more generally "Lung" by the Chinese.

It is a clear stream some 50 yards broad, running in a deep gully and much obstructed by rapids. The valley is not flat, as in the case of the Salwen, but easy slopes rise from both banks and exhibit a few patches of cultivation. A well-preserved chain-bridge 53 yards long spans the stream, the level of which we found to be 4300 feet above the sea, 200 feet lower than the Mekong.

The bridge is distant 136½ miles from Hsia-kuan; a mile and a half further brought us to the village of Kan-lan-chan, very poor, but showing indications of former prosperity. The high range we had been crossing on the two previous days is seen at great advantage from this point. To the north-east a jagged crag appears to attain a height of 13,000 or 14,000 feet; we saw no snow. The name Kan-lan-chan, in which Dr. Anderson tries to recognise a trace of Marco Polo's term Kara-zan (Carajan), is certainly curious and unlike Chinese designations in general. If a meaning must be extracted from the words, it would be "preserved olive stage," but it is exceedingly dangerous to rely upon the meaning of names as interpreted from the Chinese characters in which they are written.

In all probability the name was indigenous, and the Chinese conquerors have preserved some semblance of the original sound, while utterly perverting the meaning.

"Shan-shan-chan," the earliest name for the province of Yünnan, is probably another example of the process; reckless etymologists might be tempted to compare it with "Zar-dandan."

A heavy fall of rain set in at this place and continued for some ten hours. The aneroid needle fell from 25·37 at 9 P.M. on May 2nd, to 25·11 at 8 A.M. next morning.

One range alone now lay between us and T'êng-yueh. It turned out to be an elevated plateau of downs rather than a range, and was ascended without difficulty. The single farm-house of Kan-lu-ssu (141½ miles) presides over a few fields, but beyond this there is little or no cultivation. The road sinks deep into the surface of the down, and winds about in such a manner that the traveller can neither see where he is going nor what he is passing; but after crossing a small affluent of the Taping, we mounted a grassy but treeless upland, and halted for purposes of tiffin at the hamlet of Chin-tsai-pu, composed of four huts (144 miles). Descending a gradual

slope for three miles' distance, we suddenly came into full view of the plain of T'êng-yueh, 1000 feet immediately below us.

This hollow, about four miles long by three broad, was populous and cultivated to an extent we had not witnessed since leaving the plain of Yünnan-fu. Three large villages and some half-dozen small ones emerge like islands from a sea of rice-fields, irrigated by a stream which appeared to us to be an affluent of the Taping.

This river (Taping) affords a very good instance of the confusion in which Chinese geographical names are often involved. Its correct name is "Ta-ying," but according to the 'Topography' it is sometimes called "Ta-ch'ê." At Kan-ngai (Menglo) it becomes the "An-lo." Dr. Anderson names it the "Ta-ping," but at T'êng-yueh finds it called "Ta-ho" and "Ta-lo." The native maps provide it with still another designation as the "Yun-lung." We have thus seven names appropriated by a single river scarcely 150 miles long.

It was surprising, after travelling so many days through a region little better than a wilderness, to find ourselves in this far country suddenly descending upon the paddy plains so familiar in Eastern China.

Turning a shoulder of this deep descent, we obtained a bird's-eye view of T'êng-yueh, or rather of its walls; for the houses being few and far between, the interior of the city did not appear at that distance different in character from the country around. All we could see was a huge diagram drawn on the face of the plain, and I remember thinking that if ever the proposal to communicate with the Lunarian philosophers by means of geometric figures laid out on the earth's surface is carried into effect, the natives of the moon will see something such as here met our view.

The city appeared to us a pronounced oblong in shape. This was probably the effect of perspective, as the plan given by Dr. Anderson makes it very nearly a square.

Descending by a somewhat dangerous slope, we threaded our way through the flooded rice-fields to the large walled village of Li-chia-pu (148½ miles), from which two miles more brought us to the south-west gate of the city. We lodged in the temple indicated on Dr. Anderson's plan between Government House and the north-west gate.

For a detailed description of the city and its neighbourhood, I refer the future explorer to Dr. Anderson's work. I venture to add one local curiosity mentioned in the 'Topography' which was not seen by the Doctor or ourselves—"a lofty spiral mountain, 10 miles north of the city, enclosing a circular area, is crowned with three peaks, on which snow continues to fall after winter." This would seem to refer to a crater of unusual extent, and as the district shows undoubted volcanic signs, there is every reason to expect that "Snowy Mountain," the local name, would be well worth a visit.

T'êng-yueh seemed to possess very little trade, and its few inhabitants lacked the busy manner of Chinese citizens. But the people of Yünnan are in general notorious for laziness; even in the large cities many of the shops do not open before noon.

The sleepy city was, however, shortly afterwards awakened somewhat rudely from its lethargy by the machinations of our friend the wizard. Ten days after our departure this worthy, as reported in the 'Peking Gazette,' conspired with the banditti or Chanta (Sanda) to get possession of T'êng-yueh. This he succeeded in accomplishing, and "forthwith fortified the place with a large number of redoubts outside the walls. This state of affairs encouraged other local outbreaks towards the end of June. In the Prefecture of Yung-ch'ang a local leader named Li-ch'ao,* who had only lately been reduced to submission, broke out again at the head of upwards

* The bandit mentioned above who was driven to the hills by official extortion.

of 1000 of his partisans, occupied various stations on the post-road, and designed to seize the suspension bridge over the Salwen.

"The local outbreaks were, however, successfully grappled with, and on the 21st July Brigadier Chiang* arrived at the head of his force before T'êng-yueh. The exterior defences having been taken, mines were run up to the walls, and the first explosion was made at daylight on the 3rd of August; but owing to the great thickness of the *terre pleine*, an entrance could not be effected. A second explosion towards midnight was more successful, and the troops secured a lodgment. Some severe fighting ensued, but in the end the troops were completely victorious. Several hundreds of the insurgents were slain, and great numbers perished by drowning in the ponds. Wang, the wizard, took to flight in despair, but was found by the pursuing force so severely wounded as to be unable to speak, and was at once beheaded.

"The original outbreak at T'êng-yueh was the work of only a few hundreds of the train-bands, under a certain Su, but the revolt was strengthened by the accession of about 1000 partisans recruited from Chanta and Nan-tien by Wang."

There can be no doubt whatever that Margary was murdered by the above-mentioned train-bands of T'êng-yueh. Whether their discontent was occasioned by the disgrace into which they fell on account of the ignominious repulse inflicted upon them by Colonel Browne, or was aroused by the alacrity with which the local authorities disavowed all participation in the murder and subsequent attack, and proceeded to levy exactions on them as the penalty of their discountenanced activity, and in view of the heavy indemnity which it was thought would be exacted, it is impossible to say. In any case, it is not without some feeling of pardonable satisfaction that one reads of the slaughter of these miscreants to the number of "some hundreds," besides those who "perished in the ponds."

If a Chinese of average intelligence and education be asked what he knows of Yünnan, he will reply that it is rich in gold, silver, white copper, and precious stones; that it is a long way off; that travelling is very difficult throughout the province, as shown by the proverb "Ch'ih Yünnan-k'u" (to eat the bitterness of Yünnan); that it is a very unhealthy country; that the inhabitants speak a very intelligible tongue; and that it is cool in summer.

It will be complained that our expedition has added little to this general information; but it should be remembered that the business which occupied our best attention was of a political nature, and that we had no time to deviate from our route, or even to pause for the purpose of examining points of interest.

The mineral wealth of the province is unquestioned, but the only proof that came under our notice was a scanty export of white copper and salt. It is well known, however, that during the Mohammedan rebellion the metal trade almost disappeared, and has not yet had time to revive.

Of the sole agricultural export, opium, we can speak with some certainty. We were astounded at the extent of the poppy cultivation both in Ssŭ-ch'uan and Yünnan. We first heard of it on the boundary line between Hu-pei and Ssŭ-ch'uan in a cottage which appears in an illustration given in the work of Captain Blakiston, the highest cottage on the right of the sketch. A few miles south of this spot the most valuable variety of native opium is produced.

In ascending the river, wherever cultivation existed we found numerous fields of poppy. Even the sandy banks were often planted with it down to the water's edge; but it was not until we began our land journey in Yünnan that we fairly realised the enormous extent of its production. With some fear of being discredited, but at

* Degraded a year previously as having been responsible for the safety of Margary.

the same time with a consciousness that I am under-estimating the proportion, I estimate that the poppy fields constitute a third of the whole cultivation of Yünnan.

We saw the gradual process of its growth, from the appearance of the young spikelets above ground in January or earlier to the full luxuriance of the red, white, and purple flowers which were already falling in May. In that month the farmers were trying the juice, but we did not see the harvest gathered. We walked some hundreds of miles through poppies; we breakfasted among poppies; we shot wild ducks in the poppies. Even wretched little hovels in the mountains were generally attended by a poppy patch.

The ducks, called locally opium ducks, which frequently supplied us with a meal, do really appear, as affirmed by the natives, to stupefy themselves by feeding on the narcotic vegetable. We could walk openly up to within 20 yards of them, and even then they rose very languidly. We are not, however, compelled to believe with the natives that the flesh of these birds is so impregnated with laudanum as to exercise a soporific influence on the consumer. They are found in great numbers in the plain of Tung-ch'uan, in Northern Yünnan, and turn out to be the *Tadorna vulpanser*.

In the same district, and in no other, we met with the *Grus cinerea*, an imposing bird, which is also a frequenter of opium fields.

The poppy appeared to us to thrive in every kind of soil, from the low sandy borders of the Yang-tzu to the rocky heights of Western Yünnan; but it seemed more at home, or at any rate was more abundant, in the marshy valleys near Tung-ch'uan, at an elevation of 7060 feet (7150 feet, according to Garnier).

I am not concerned here with the projects or prospects of the Society for the Abolition of Opium; if, however, they desire to give the strongest impetus to its growth in Yünnan, let them by all means discourage its production in India.

The trade route from Yünnan-fu to T'êng-yueh is the worst possible route with the least conceivable trade. It is actually dangerous to a cautious pedestrian, not on account of the steep ascents and descents which constantly confront him—time, patience, and a proper conservation of breath suffice to overcome these—nor from the precipices which await the unwary, but from the condition of the path itself. This is paved throughout the whole distance, except on some of the high downs and ridges —a proof, if any were wanting, of the former importance of the route. The paving is of the usual Chinese pattern—rough boulders and blocks of stone laid somewhat loosely together on the surface of the ground: "good for ten years and bad for ten thousand," as the Chinese proverb admits.

On the level plains of China, in places where the population is sufficiently affluent to subscribe for occasional repairs, this system has much practical value. But in the Yünnan mountains the roads are never repaired; so far from it, the indigent natives extract the most convenient blocks to stop the holes in their hovel walls or to build a fence on the windward side of their poppy patches. The rain soon undermines the pavement, especially where it is laid on a steep incline; whole sections of it topple down the slope, leaving chasms a yard or more in depth; and isolated fragments balance themselves here and there, with the notorious purpose of breaking a leg or spraining an ankle.

The track often exhibits very much the appearance of a London road when "the streets are up," and one almost looks for the familiar gas-pipes. It is a joyous moment for the traveller when he reaches a sandy unpaved down, and can use his eyes for other purposes than that of selecting the stone which is least likely to break his neck.

In some parts, however, of the unpaved route the ground splits vertically, and

huge flakes of earth, carrying the path with them, peel away into a gully or precipice. This would probably not be dangerous to a pedestrian if he were moderately cautious, and he would soon be rendered so by the sight of the body or bones of some unlucky mule which has accompanied the landslip.

By an improved system of paving and a better selection of gradients, the route might be made convenient enough for carriages by mules and coolies; but it seems hopeless to think of making it practicable for wheel carriages. The valleys, or rather abysses, of the Salwen and Mekong must long remain insuperable difficulties, not to mention many other obstacles.

I do not mean that it would be absolutely impossible to construct a railway. A high authority has informed me that if shareholders will provide money, they will always find an engineer to spend it. By piercing half-a-dozen Mont Cenis tunnels and erecting a few Menai bridges, the road from Burma to Yünnan-fu could, doubtless, be much improved.

It seems to have been assumed by the members of Colonel Sladen's mission that when T'êng-yueh is reached, the obstacles to a highway into Yünnan have been surmounted. The fact is that the difficulties begin at T'êng-yueh. All homage to Dr. Anderson for his careful consideration of the subject. The Doctor has our humble corroboration for his assertion that a practicable road might be constructed, without much difficulty, through the Kakhyen hills to Manwyne.

From that village to T'êng-yueh the route is direct and easy; but T'êng-yueh draws whatever prosperity it possesses from the Ta-pêng valley; the trader is still separated by many steep miles from Yung-ch'ang, and when he arrives at that city he will fail to find a market. He must struggle on to Tali; in the quarterly fair he may meet with a certain demand for pedlery, but for little else. It is not to be supposed that however energetic the British merchant is, or ought to be, he will attempt the wild route of Yünnan-fu; but in the event of his attaining that capital, he will suddenly be aware that foreign manufactures can be conveyed with ease and rapidity from Canton, and his intelligence will at last open to the fact that Yünnan-fu is only 400 miles distant from the sea.

Loth as most Englishmen are to admit it, the simple and evident approach to Eastern Yünnan is from the Gulf of Tonquin. But it by no means follows that the same holds true of the western part of the province. The object should be to attain some town of importance south of Yung-ch'ang and Tali-fu, such as Shun-ning, from which both those cities could be reached by ascending the valleys, instead of crossing all the mountain ranges, as must be done if the T'êng-yueh route is selected. This brings us back to the old project for a route viâ Thein-nee, which Dr. Anderson allows "has been recognised for centuries as a highway from China to Burma."

The Doctor gives an alarming account, drawn from Burmese sources, of the difficulties to be overcome, in the shape of forty-six hills and mountains, five large rivers, and twenty-four smaller ones; but until a competent observer has traversed the route this must be considered somewhat vague. The Government of British Burma might with advantage send a native, duly instructed, to decide the matter. It is disappointing to find these difficulties alluded to, without any mention of the obstacles which beset the route favoured by the Doctor.

Here is a notice, dug out of the 'Topography,' which may in some degree supply the want:—"The upper route for the elephants sent as tribute (from Burma) is by Yung-ch'ang and Pu-piao, crossing the Wu-chuang range by a narrow and dangerous track, on which horses cannot travel abreast. Beyond these mountains is the Salwen, and beyond the Salwen is the district of the Po-i (Tai) people. Still farther on, the Kao-li-kung range has to be ascended, and travelling again becomes dangerous in

the extreme. The natives construct palisades on the mountain tops as a defence. Proceeding south-west from T'êng-yueh, the three towns of Nan-tien, Muangla, and Lung-ch'uan are successively passed. Beyond Lung-ch'uan (we are now entering Burma) all is level ground, and a thousand miles of country may be seen at one view. There are no hills or gorges whatever. In ten days more we arrived at Mêng-mi, in two more at Pao-king, and in another ten at (the capital of) Burma. Ten days farther bring the traveller to Toun-goo, and yet another ten to Pegu, which is at present under a savage chief."

As this was written some 300 years ago, the latter passage can intend no disrespect to the Chief Commissioner.

But there is, after all, no necessity for Governments or merchants to be exercised about the special advantages of this or the other route. Given a certain trade, and well-devised regulations to encourage and protect it, the discovery of the easiest lines of communication may safely be left to the traders themselves.

Let us first discover the trade.

For the benefit, however, of enthusiastic path-finders, I conclude these very desultory remarks by citing from the 'Topography' an entirely new and original route:—"The lower route for tribute elephants leads from Chin-tung to Chên-yuan-fu, one day's journey, and then in two days enters the district of Ch'ê-li. Two days more bring the traveller to P'u-erh, which is subject to Ch'ê-li. This region produces tea, and contains a lofty and beautiful hill called Ming-kuang, on which a chief of Ch'ê-li resides. In two more days a great river is reached, making a bend round some 300 miles of country in which elephants breed. The hills have been named 'Chi-chien' (arrow-flight). There is here a tablet engraved in ancient times, but the inscription is undecipherable. In four days more one comes to the headquarters of the Ch'ê-li Government, situated at the foot of the 'Nine Dragon Hills,' near the great river, which is called the 'Nine Dragon River,' and is the continuation of the Black Water (Mekong).

"Travelling from Ch'ê-li eight days' journey to the south-west, one reaches Pa-pe-si-fu (eight hundred wives), a country abounding in temples and pagodas. Every village possesses a temple, every temple a pagoda; there are 10,000 villages and 10,000 pagodas. This land is called the Kingdom of T'zŭ. The ruler abhors the taking of life, and is inclined to peace, but when his enemies seized (part of his territory), he had nothing for it but to despatch an army and settle the question.

"One month's journey to the south-west lies Lao-chua, the chief of which has a son to succeed him, but no daughters. Fifteen or sixteen days westward bring one to the shore of the Western Sea in Pegu, the country of a savage chief." *

### *Latitudes.*

The following observations for latitudes by meridian altitudes, and many others, were made with an 8-inch sextant belonging to Mr. Grosvenor.

In calculating the latitudes the barometric pressure has been neglected, as it cannot materially affect the result of observations taken in pairs north and south at short intervals of time.

Many opportunities occurred during the journey of comparing the determinations

* *Ch'êli* is the Chinese name of Kiang Hung (or Kiang Hung of Garnier); *Pa-pe-si-fu* was the Chinese name of a medieval Shan kingdom on the Mekong, of which the capital appears to have been Muang-Yong, in about lat. 21° 10′ (see Garnier, i. pp. 385–387, and p. 479); *Lao-chua* was the Shan or Thai kingdom of Chandapuri or Vien-chang, the *Laos* of the Dutch mission of Gerard von Wusthof (1641), and of the 17th century Jesuits. —H. Y.

of Messrs. Blakiston and Garnier with my own. The only serious case of discrepancy appeared at Tali-fu. As Mr. Garnier was in great difficulty and hurry during the few hours he spent at that city, I make bold to stand by my own result.

| No. | Place. | Date. | | Double Altitude corrected for I. E. | Resulting Latitude. | Mean or Corrected Latitude. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ | ° ′ ″ | ° ′ ″ | Observations— |
| 1 | Yünnan-fu .. .. | Mar. 6 | Sirius | 96 50 35 | 25 2 41 | | Good. |
| 2 | Ditto .. .. | „ 8 | δ Urs. Maj. | 105 16 25 | 25 2 35 | 25 2 44 | Fair. |
| 3 | Ditto .. .. | „ 9 | Sirius | 96 50 25 | 25 2 45 | | Good. |
| 4 | Ditto .. .. | „ 12 | δ Urs. Maj. | 105 17 5 | 25 2 55 | | Fair. |
| 5 | Lao-ya-kuan .. | „ 27 | Spica | 109 3 50 | 24 57 42 | 24 57 50 | Fair. |
| 6 | Lu-fêng-hsien .. | „ 28 | δ Urs. Maj. | 105 29 50 | 25 9 23 | 25 9 5 | Good. |
| 7 | Ditto .. | „ 28 | Spica | 108 41 40 | 25 8 47 | | |
| 8 | Lu-li-ching .. | „ 29 | δ Urs. Maj. | 105 37 30 | 25 13 13 | 25 13 0 | Fair. |
| 9 | Kuang-t'ung-hsien .. | „ 31 | δ Urs. Maj. | 105 32 20 | 25 10 38 | 25 10 20 | Not good. |
| 10 | Chu-hsiung-fu .. | Apr. 1 | Spica | 108 56 20 | 25 1 27 | 25 1 45 | Fair. |
| 11 | Ditto .. | „ 2 | δ Urs. Maj. | 105 15 10 | 25 2 3 | | |
| 12 | Chên-nan-chou .. | „ 3 | δ Urs. Maj. | 105 34 10 | 25 11 33 | 25 11 10 | Good. |
| 13 | Ditto .. | „ 3 | Spica | 108 37 40 | 25 10 47 | | |
| 14 | Sha-ch'iao .. .. | „ 4 | δ Urs. Maj. | 105 39 10 | 25 14 3 | 25 14 2 | Good. |
| 15 | Ditto .. .. | „ 4 | Spica | 108 31 10 | 25 14 2 | | |
| 16 | T'ien-shên-t'ang .. | „ 5 | δ Urs. Maj. | 105 49 20 | 25 19 8 | 25 19 10 | Good. |
| 17 | Ditto .. | „ 5 | Spica | 108 20 50 | 25 19 12 | | |
| 18 | Chao-chou .. .. | „ 10 | Spica | 107 49 20 | 25 35 0 | 25 35 0 | Satisfactory. |
| 19 | Tali-fu .. .. .. | „ 11 | δ Urs. Maj. | 106 34 40 | 25 41 53 | 25 41 48 | Good. |
| 20 | Ditto .. .. .. | „ 11 | Spica | 107 35 50 | 25 41 43 | | |
| 21 | Ho-chiang-pu .. | „ 16 | δ Urs. Maj. | 106 20 50 | 25 34 59 | 25 34 48 | Satisfactory. |
| 22 | Ditto .. | „ 16 | Spica | 107 50 0 | 25 34 38 | | Good. |
| 23 | Yang-pi .. . | „ 17 | δ Urs. Maj. | 106 31 10 | 25 40 9 | 25 40 6 | Fair. |
| 24 | Ditto .. .. | „ 17 | Spica | 107 39 10 | 25 40 3 | | Good. |
| 25 | Huang-lien-pu .. | „ 19 | δ Urs. Maj. | 106 13 40 | 25 31 24 | 25 31 16 | Good. |
| 26 | Ditto .. | „ 19 | Spica | 107 57 0 | 25 31 8 | | |
| 27 | T'ien-ching-pu .. | „ 20 | δ Urs. Maj. | 106 12 10 | 25 30 39 | 25 30 26 | Good. |
| 28 | Ditto .. | „ 20 | Spica | 107 58 50 | 25 30 13 | | Hazy. |
| 29 | Chü-tung .. .. | „ 21 | δ Urs. Maj. | 106 1 50 | 25 25 30 | 25 25 19 | Not very good. |
| 30 | Ditto .. .. | „ 21 | Spica | 108 9 0 | 25 25 8 | | Good. |
| 31 | Sha-yang .. .. | „ 23 | δ Urs. Maj. | 105 50 0 | 25 19 35 | 25 19 19 | Fair. |
| 32 | Shui-chai .. .. | „ 24 | δ Urs. Maj. | 105 43 50 | 25 16 30 | 25 16 8 | Good. |
| 33 | Ditto .. .. | „ 24 | Spica | 108 27 40 | 25 15 47 | | Very good. |
| 34 | Kuan-p'o .. .. | „ 25 | δ Urs. Maj. | 105 37 30 | 25 13 20 | 25 13 0 | Good. |
| 35 | Ditto .. .. | „ 25 | Spica | 108 33 50 | 25 12 42 | | |
| 36 | Yung-ch'ang-fu .. | „ 26 | δ Urs. Maj. | 105 25 20 | 25 7 15 | 25 7 8 | Fair. |
| 37 | Ditto .. | „ 26 | Spica | 108 45 10 | 25 7 2 | | Good. |
| 38 | P'u-p'iao .. .. | „ 28 | δ Urs. Maj. | 105 12 40 | 25 0 55 | 25 0 43 | Good. |
| 39 | Ditto .. .. | „ 28 | Spica | 108 58 10 | 25 0 32 | | |
| 40 | Ta-pan-ching .. | „ 29 | δ Urs. Maj. | 105 12 40 | 25 0 53 | 25 0 49 | Fair. |
| 41 | Ditto .. | „ 29 | Spica | 108 57 40 | 25 0 46 | | |
| 42 | Ho-mu-shu .. .. | „ 30 | Spica | 109 3 20 | 24 57 56 | 24 58 0 | Good. |
| 43 | T'ai-p'ing-p'u .. | May 1 | δ Urs. Maj. | 105 5 30 | 24 57 18 | 24 57 8 | Good. |
| 44 | Ditto .. | „ 1 | Spica | 109 4 10 | 24 57 31 | | Indifferent, rejected. |
| 45 | T'êng-yueh .. .. | „ 3 | δ Urs. Maj. | 105 14 50 | 25 1 58 | 25 1 47 | Good. |
| 46 | Ditto .. .. | „ 3 | Spica | 108 56 0 | 25 1 36 | | Fair. |

### *Altitudes.*

Of three aneroids, which were procured at Shanghae, only one proved equal to the exigencies of the route.

Before leaving it was compared with a standard mercurial barometer, and showed an index error of −·06, that is, ·06 inches were to be subtracted from all its readings

to give the true reading. On returning to Shanghae the comparison was repeated, and exhibited an error of + ·09. It was also tested by means of an air-pump as low as 23 inches, with a column of mercury, a few days after our return. The comparison was most satisfactory, and the needle after a short interval returned precisely to its original position.

It seems, therefore, safe to assume that for all practical ends the indications afforded by this instrument were sufficiently exact. The index error may be neglected, considering the much greater inaccuracies entailed upon absolute altitudes by weather changes. On the route under consideration the weather was, with slight exception, very equable, clear, and with a light breeze from west or south-west.

There is a difficulty in deciding what to assume as the sea-level pressure. Mr. Garnier took the mean pressure for each separate month at Macao as his basis for calculating heights in this same region. He gives these as 768 mill. for February, 766 for March, and 762 for April. These were taken in the year 1867. By the kindness of Father Lelec, Director of the Observatory attached to the Jesuit Mission at Sicawei, I am enabled to give the mean pressure at the sea-level near Shanghae for the same months in 1876:—

| | |
|---|---|
| February .. .. .. .. .. .. .. | 768·25 |
| March .. .. .. .. .. .. .. .. | 765·02 |
| April .. .. .. .. .. .. .. .. | 761·75 |

I cannot do better than employ these.

The only remaining difficulty is the question of correction for temperature. There seems nothing for this but to assume it the same for both upper and lower stations. Other small corrections may well be neglected.

The level of the Yünnan-fu Lake, according to Mr. Garnier, is 1950 metres = 6397 feet. Our determination is 6380 feet for the interior of the city, which is slightly higher than the lake.

Mr. Garnier puts the altitude of the Tali-fu Lake at 2120 metres, equivalent to 6955 feet. The level of the lake being probably some 200 feet lower than our station in the city, 7090 feet, the agreement between the two results is remarkable.

The deduced altitude of T'êng-yueh is more difficult to compare. The Sladen Mission is quoted by Colonel Yule as having fixed it at 5800 feet. Dr. Anderson, a member of that mission, puts it at "nearly 5000 feet." On Garnier's map it is set down as 1884 metres, equal to 6181 feet. These discrepancies between deductions from the same observations appear hopeless. Our determination gives the level as 5540 feet.

I append data and results to facilitate correction and future comparison.

| Name of Place. | Mean of observed Pressures. | Mean of observed Temperatures. | Height. | Remarks. |
|---|---|---|---|---|
| Yünnan-fu .. .. .. | 23·78 | 51 | 6,380 | March 6th to 26th. |
| Tu-shu-p'o .. .. .. | 23·74 | 69 | 6,640 | |
| An-ning-chou .. .. | 24·02 | 54 | 6,141 | |
| Ch'ing-lung-shao .. .. | 23·91 | 62 | 6,370 | |
| Lao-ya-kuan .. .. .. | 23·64 | 56 | 6,600 | |
| Lu-fêng-hsien .. .. | 24·69 | 56 | 5,420 | |
| Lu-li-ching .. .. .. | 23·95 | 53 | 6,620 | |
| Hsin-p'u .. .. .. .. | 24·00 | 68 | 6,340 | |
| Shê-tzŭ .. .. .. .. | 24·18 | 57 | 5,970 | |
| Mêng-hsi-p'u .. .. .. | 23·65 | 72 | 6,780 | |
| Kuang-t'ung-hsien .. | 23·99 | 60 | 6,230 | April 1st. |

| Name of Place. | Mean of observed Pressures. | Mean of observed Temperatures. | Height. | Remarks. |
|---|---|---|---|---|
| Hsiao-yao-chan .. .. | 24·99 | 71 | 6,360 | |
| Chü-hsiung-fu .. .. | 24·11 | 62 | 6,100 | |
| Lü-ho-kai .. .. | 23·94 | 71 | 6,340 | |
| Chên-nan-chou .. .. | 23·87 | 57 | 6,270 | |
| Sha-ch'iao .. .. .. | 23·65 | 55 | 6,440 | |
| Ta-fo-ssü .. .. .. | 23·29 | 73 | 6,980 | |
| T'ien-shen-t'ang .. .. | 22·50 | 57 | 7,890 | |
| P'u-ch'ang-ho .. .. | 23·12 | 72 | 7,320 | |
| P'u-p'êng .. .. .. | 23·17 | 60 | 7,130 | |
| Mu-pan-p'u .. .. .. | 23·43 | 76 | 7,000 | |
| Yunnan-i .. .. .. | 23·58 | 64 | 6,680 | |
| Ch'ing-hua-tung .. .. | 23·47 | 59 | 6,740 | |
| Chia-mai-p'u .. .. .. | 24·07 | 80 | 5,570 | |
| Hung-ai .. .. .. .. | 24·21 | 60 | 5,590 | |
| Ting-hsi-ling .. .. .. | 22·65 | 60 | 7,740 | |
| Hsin-p'u-t'ang .. .. | 23·25 | 71 | 6,740 | |
| Chao-chou .. .. .. | 23·45 | 59 | 6,780 | |
| Hsia-kuan .. .. .. | 23·32 | 66 | 7,020 | Probably too high. |
| Tali-fu .. .. .. .. | 23·29 | 69 | 7,090 | April 11th to 15th. |
| Hsiao-ho-chiang .. .. | 24·74 | 74 | 5,450 | |
| Ho-chiang-pu .. .. | 24·87 | 57 | 5,150 | |
| Ma-ch'ang .. .. .. | 24·64 | 83 | 5,660 | |
| Yang-pi .. .. .. .. | 24·85 | 61 | 5,200 | |
| Ch'ing-shui-shao .. .. | 22·45 | 67 | 8,090 | |
| T'ai-p'ing-p'u .. .. | 23·52 | 60 | 6,710 | |
| Shun-pi River .. .. | 24·89 | 74 | 5,290 | |
| Huang-lien-p'u .. .. | 24·78 | 60 | 5,270 | |
| Wan-sung-an .. .. .. | 22·65 | 71 | 7,910 | April 20th. |
| T'ien-ching-p'u .. .. | 22·10 | 59 | 8,410 | |
| P'ing-man-shao .. .. | 23·35 | 83 | 7,170 | |
| Ch'ü-tung .. .. .. | 24·64 | 60 | 5,520 | |
| Yung-kuo-ssü .. .. | 22·20 | 73 | 8,510 | |
| Sha-yang .. .. .. | 24·87 | 73 | 5,300 | |
| P'ing-p'o .. .. .. .. | 25·24 | 77 | 4,920 | |
| Shui-chai .. .. .. | 23·60 | 67 | 6,700 | April 25th. |
| Tien-ching-p'u .. .. | 22·32 | 61 | 8,166 | |
| Kuan-p'o .. .. .. | 23·68 | 66 | 6,600 | |
| Yung-ch'ang-fu .. .. | 24·35 | 71 | 5,880 | |
| Kao-tzü-p'u .. .. .. | 23·45 | 84 | 6,980 | |
| P'u-p'iao .. .. .. .. | 25·33 | 80 | 4,550 | |
| Ta-pan-ching .. .. .. | 25·56 | 69 | 4,490 | |
| Salwen River .. .. .. | 27·62 | 96 | 2,430 | April 30th. |
| Village on R. B. .. .. | 27·41 | 96 | 2,670 | |
| Ho-mu-shu .. .. .. | 24·65 | 71 | 5,560 | |
| Hsiang-po .. .. .. | 23·25 | 75 | 7,230 | |
| Highest point of pass .. | 20·05 | 75 | 8,730 | |
| T'ai-p'ing-p'u .. .. | 22·68 | 65 | 7,780 | |
| Ta-li-shu .. .. .. | 24·61 | 62 | 5,480 | |
| Shwe-li River .. .. | 25·68 | 62 | 4,300 | |
| Kan-lan-chan .. .. .. | 25·24 | 65 | 4,810 | |
| Chin-t'sai-p'u .. .. .. | 23·11 | 59 | 7,260 | |
| T'êng-yueh-chou .. .. | 24·56 | 61 | 5,540 | May 3rd. |

### *Itinerary.*

The following itinerary from Yünnan-fu to Tali-fu gives the distances as estimated by ourselves, with full allowance for the windings of the road, in statute miles, and the distance in *li* as given by the local officials.

In the itinerary from Hsia-kuan to T'êng-yueh I have put side by side the

distances according to four different parties. Column A exhibits our estimate; B gives that of a Burmese Mission to China quoted in an Appendix to Dr. Anderson's 'Expedition'; C is the estimate furnished us by the Chinese officials; and D is taken from a list of distances prepared by a caravan contractor at Yünnan-fu.

ITINERARY, YÜNNAN-FU TO TALI-FU.

| Date. | Name of Place. | Distance in Miles. | Distance in *li* according to Chinese. | Remarks. |
|---|---|---|---|---|
| Mar. 26 | Yünnan-fu. | | | |
| „ 26 | Pi-chi-kuan .. .. .. | 7 | 30 | Small village. |
| „ 26 | Ch'ang-p'o .. .. .. | 8¾ | 45 | Hamlet. |
| „ 26 | Tu-shu-p'o .. .. .. | 11½ | 50 | Small village. |
| „ 26 | Anning-chou .. .. .. | 16¼ | 70 | Poor, small, and dilapidated city. |
| „ 26 | P'ing-ti-shao .. .. .. | 21½ | .. | Hamlet. |
| „ 26 | Tsao-p'u .. .. .. .. | 22¼ | 95 | Small village. |
| „ 26 | Ch'ing-lung-shao .. .. | 26½ | 110 | Small village. |
| „ 26 | An-fêng-ying .. .. .. | 30¾ | 130 | Wretched hamlet. |
| „ 26 | Lu-piao .. .. .. .. | 31¾ | 135 | Half-ruined village. |
| „ 27 | Lao-ya-kuan .. .. .. | 35 | 150 | Village, less poor than usual. |
| „ 27 | Ch'ing-shui-kou .. .. | 37½ | 162 | A few cottages. |
| „ 27 | Po-han-ch'ang .. .. | 38 | 170 | Wretched hamlet. |
| „ 27 | Yang-nao-shao .. .. | 40½ | 175 | Wretched hamlet. |
| „ 27 | Tâ-yao-chan .. .. .. | 43¾ | 190 | |
| „ 27 | Wang-chia-wan .. .. | 47½ | 215 | A few huts. |
| „ 27 | Huang-t'u-p'o .. .. | 55½ | 240 | |
| „ 28 | Lu-fêng-hsien .. .. | 56½ | 245 | Very poor ruined city. |
| „ 29 | Ta-t'zu-ssŭ .. .. .. | 62 | 275 | Five huts. |
| „ 29 | Lu-li-ching .. .. .. | 64¼ | 285 | Hamlet. |
| „ 30 | Hsin-p'u .. .. .. .. | 68¼ | 305 | Poor hamlet. |
| „ 30 | Ta-shao .. .. .. .. | 71¼ | .. | Guard-house. |
| „ 30 | Shê-t'zŭ .. .. .. .. | 73½ | 335 | Poor village. |
| „ 31 | Mêng-hsi-p'u .. .. .. | 79½ | 365 | Hamlet. |
| „ 31 | Kuang-t'ung-hsien .. | 85½ | 395 | City rather more prosperous. |
| April 1 | Hui-têng-kuan .. .. | 89½ | 410 | Guard-house. |
| „ 1 | Shih-chien-p'u .. .. | 92 | 425 | Poor hamlet. |
| „ 1 | Hsia-yao-chan .. .. | 95 | 435 | Poor village. |
| „ 1 | Shui-ch'ê-shao .. .. | 99¼ | 445 | Four huts. |
| „ 1 | Ch'u-hsiung-fu .. .. | 103½ | 465 | Large city; ruinous and very thinly inhabited, public buildings falling. |
| „ 3 | San-chia-t'ang .. .. | 105¾ | 475 | Hamlet. |
| „ 3 | Ta-shih-p'u .. .. .. | 110¼ | 495 | Hamlet. |
| „ 3 | Ch'ing-yuan-shao .. .. | 113¾ | 505 | |
| „ 3 | Lü-ho-kai .. .. .. | 117 | 525 | Considerable village, much ruined. |
| „ 3 | Kao-fêng-shao .. .. | 120½ | 540 | Guard-house. |
| „ 3 | Chên-nan-chou .. .. | 123¼ | 555 | Small and very poor town. |
| „ 4 | Shui-p'ang-p'u .. .. | 128 | 570 | Miserable hamlet. |
| „ 4 | T'ien-hsin .. .. .. | 128¾ | 580 | Hamlet. |
| „ 4 | Sha-ch'iao .. .. .. | 131 | 590 | Large but poor village. |
| „ 5 | Hsin-p'u .. .. .. .. | 135½ | 610 | Poor hamlet. |
| „ 5 | Ta-fo-ssŭ .. .. .. | 137 | 620 | A few huts. |
| „ 5 | Tso-lin-p'u .. .. .. | 138½ | 630 | One hut. |
| „ 5 | Ying-wu-kuan .. .. | 141¾ | 640 | Small hamlet and guard-house. |
| „ 5 | Tien-shên-t'ang .. .. | 143¼ | 650 | Poor hamlet. |
| „ 5 | P'u-chang-ho .. .. .. | 147¾ | 670 | Wretched village. |
| „ 5 | P'u-p'êng .. .. .. | 150¾ | 680 | Poor village. |
| „ 7 | Chin-chi-miao .. .. | 155 | 700 | Ruined temple and one hut. |
| „ 7 | Shui-p'ang-pu .. .. | 156¾ | .. | Poor hamlet. |

| Date. | Name of Place. | Distance in Miles. | Distance in *li* according to Chinese. | Remarks. |
|---|---|---|---|---|
| April 7 | Annan-kuan .. .. .. | 157½ | 710 | Two huts. |
| „ 7 | Mu-pan-p'u .. .. .. | 163½ | 720 | Considerable village, half ruined. |
| „ 7 | Yunnan-i .. .. .. | 168½ | 740 | Village. |
| „ 8 | Kas-kuan-p'u .. .. .. | 169½ | .. | Large village. |
| „ 8 | Kou-t'sun-p'u .. .. .. | 176½ | 770 | Hamlet. |
| „ 8 | Ch'ing-hua-tung .. .. | 177½ | 775 | Temple near cave. |
| „ 9 | I-chiang-p'u .. .. .. | 179½ | 785 | Poor hamlet. |
| „ 9 | Chia-mai-p'u .. .. .. | 182½ | 800 | Hamlet. |
| „ 9 | Hung-ai .. .. .. .. | 186½ | 815 | Large village, half ruined. |
| „ 10 | Ch'iao-t'ow .. .. .. | 187½ | .. | Hamlet. |
| „ 10 | Ting-hsi-ling .. .. .. | 189½ | 830 | Hostel on highest point of col. |
| „ 10 | Ta-shao .. .. .. .. | 192½ | 845 | Hamlet somewhat ruined. |
| „ 10 | Hsin-p'u-t'ang .. .. | 196½ | 860 | Village nearly all ruins. |
| „ 10 | Chao-chou .. .. .. | 200½ | 875 | Large and well-to-do town. |
| „ 11 | Hsia-kuan .. .. .. | 207½ | 908 | Small town on river; much traffic. |
| „ 11 | Tali-fu .. .. .. .. | 215 | 935 | |

ITINERARY, TALI-FU (HSIA-KUAN) TO T'ÊNG-YUEH.

| Date. | Name of Place. | A. | B. | C. | D. | Remarks. |
|---|---|---|---|---|---|---|
| | | miles | miles | *li* | *li* | |
| April 16 | Hsia-kuan .. .. | .. | .. | .. | .. | Fortified town. |
| „ 16 | T'ang-tzu-p'u .. .. | 2½ | .. | 10 | .. | Poor hamlet. |
| „ 16 | Shih-ch'uan-p'u .. | 5½ | .. | 25 | .. | Very small hamlet. |
| „ 16 | Mao-tsão-t'ang .. | 7½ | .. | .. | .. | Hamlet. |
| „ 16 | Hsiao-ho-chiang .. | 9½ | .. | 45 | .. | Hamlet. |
| „ 16 | Ho-chiang-p'u* .. | 10½ | 11 | 50 | 55 | Small village near junction of streams. |
| „ 17 | Chi-i-p'u .. .. .. | 12 | .. | 65 | .. | Hamlet. |
| „ 17 | Chin-niu-tün .. .. | 13½ | .. | 80 | .. | Hamlet. |
| „ 17 | Ma-ch'ang .. .. | 16½ | .. | 90 | .. | Hamlet. |
| „ 17 | Yang-pi .. .. .. | 19½ | 23 | 100 | 110 | Walled town on river. |
| „ 18 | Pei-mên-p'u .. .. | 22 | .. | 110 | .. | Hamlet, now building. |
| „ 18 | Ch'ing-shui-shao .. | 27 | .. | 140 | .. | A few huts. |
| „ 18 | T'ai-p'ing-p'u .. .. | 29½ | .. | 155 | .. | A few huts. |
| „ 19 | Tou-po'-shao .. .. | 31½ | .. | 170 | .. | Three huts. |
| „ 19 | Niu-p'ing-p'u .. .. | 34½ | .. | 185 | .. | Hamlet. |
| „ 19 | Shun-pi Bridge .. | 36½ | .. | 196 | .. | Iron suspension-bridge. |
| „ 19 | Huang-lien-p'u .. | 38½ | 44† | 210 | 170 | Village small. |
| „ 20 | Chiao-kou-shan .. | 40½ | .. | 225 | .. | One hut. |
| „ 20 | Pai-t'u-p'u .. .. | 43½ | .. | 240 | .. | Two huts. |
| „ 20 | Wan-sung-an .. .. | 45½ | .. | 250 | .. | Temple in ruins. |
| „ 20 | Tien-ching-p'u .. | 47 | .. | 260 | .. | Poor hamlet. |
| „ 21 | Sha-sung-shao .. | 48½ | .. | 270 | .. | Five huts. |
| „ 21 | Mei-hua-p'u .. .. | 50½ | .. | 285 | .. | Three huts. |
| „ 21 | P'ing-man-shao .. | 52½ | .. | 295 | .. | Two huts. |
| „ 21 | Hei-yu-kuan .. .. | 55½ | .. | 305 | .. | Seven or eight huts. |
| „ 21 | Shu-tui .. .. .. | 56½ | .. | .. | .. | Hamlet. |

* The Burmese and the Carrier's itineraries begin at this point. For the previous distances, I assume, for uniformity, that A made somewhat the same proportionate estimate with B and C with D as they did farther west.

† This also is an assumption.

| Date. | Name of Place. | A. | B. | C. | D. | Remarks. |
|---|---|---|---|---|---|---|
| | | miles | miles | *li.* | *li.* | |
| April 21 | Ch'ü-tung, near Yung-p'ing .. .. | 58¼ | .. | 320 | .. | Large village, half ruins. |
| „ 22 | T'ieh-ch'ang .. .. | 62¼ | .. | 330 | .. | A few huts. |
| „ 22 | Hsiao-hua-ch'iao .. | 63¾ | .. | .. | .. | Hamlet. |
| „ 22 | Hua-ch'iao .. .. | 64¾ | .. | 340 | .. | Long village. |
| „ 22 | T'ien-ching-p'u .. | 66¾ | .. | 360 | .. | Two huts. |
| „ 22 | Yung-kuo-ssŭ .. .. | 67¼ | .. | 370 | .. | Two huts. |
| „ 22 | Sha-Mu-ho or Sha-yang .. .. .. | 71½ | 80 | 390 | 340 | Large village, fair. |
| „ 24 | Yung-fêng-chuang | 74 | .. | .. | .. | Small village. |
| „ 24 | Me-kong River .. | 75 | .. | .. | .. | Iron suspension-bridge, 60 yards long. |
| „ 24 | P'ing-p'o .. .. .. | 76 | .. | 420 | .. | Hamlet. |
| „ 24 | Shui-chai .. .. | 77¾ | .. | 435 | 410 | Village. |
| „ 25 | Tali-shao .. .. | 80¼ | .. | 450 | .. | A few huts. |
| „ 25 | T'ien-ching-p'u .. | 81¾ | .. | 465 | .. | One shed. |
| „ 25 | Niu-chio-kuan .. | 83 | .. | 475 | .. | Two huts. |
| „ 25 | Kuan-p'o .. .. | 84 | 96 | 480 | .. | Small village. |
| „ 26 | Pan-ch'iao .. .. | 88¼ | .. | 495 | .. | Large village. |
| „ 26 | Pei-kuan-t'ang .. | 90¾ | .. | 505 | .. | Ruined village. |
| „ 26 | Yung-ch'ang .. .. | 93 | 104 | 515 | 500 | |
| „ 28 | Wo-shih-wo .. .. | 96½ | .. | 533 | .. | Poor hamlet. |
| „ 28 | Kao-tzu-p'u .. .. | 98½ | .. | 550 | .. | A few huts. |
| „ 28 | Lêng-shui-ch'ing .. | 101 | .. | 568 | .. | Small hamlet. |
| „ 28 | P'u-piao .. .. .. | 106½ | 116 | 585 | 570 | Large village. |
| „ 29 | Kuan-yin-ssŭ .. .. | 110 | .. | 600 | .. | Ruined temple. |
| „ 29 | Fang-ma-ch'ang .. | 111¼ | .. | 610 | .. | Ruined hamlet. |
| „ 29 | Ta-pan-ching .. .. | 113½ | .. | 618 | .. | Four or five huts. |
| „ 30 | Salwen River .. .. | 121 | .. | 638 | .. | Iron suspension-bridge, 140 yards long. |
| „ 30 | Ho-mu-shu .. .. | 125 | .. | 673 | 660 | Poor hamlet. |
| May 1 | Hsiang-po .. .. | 127½ | .. | 698 | .. | Very poor hamlet. |
| „ 1 | Highest point of pass | 129½ | | | | |
| „ 1 | T'ai-ping-p'u .. .. | 131½ | .. | 723 | .. | Very poor hamlet. |
| „ 2 | Tali-shu .. .. .. | 134½ | .. | 748 | .. | Four huts. |
| „ 2 | Shuay-li River .. | 136½ | .. | 758 | .. | Iron suspension-bridge, 53 yards long. |
| „ 2 | Kan-lan-chan .. .. | 138 | 146 | 766 | 770 | Poor village. |
| „ 3 | Kan-lu-ssu .. .. | 141½ | .. | 783 | .. | One hut. |
| „ 3 | Chin-t'sai-pu .. .. | 144 | .. | 798 | .. | Four huts. |
| „ 3 | Li-chia-p'u .. .. | 148¾ | .. | 818 | .. | Large village. |
| „ 3 | T'êng-yueh, Momein | 150¾ | 162 | 833 | 840 | |
| | | | | 166 | 168 | miles. |

## IV. ON THE CHINESE TEA-TRADE WITH TIBET.*

Though very widely cultivated in Ssŭ-ch'uan, tea does not form the subject of any considerable export. With certain exceptions, it merely supplies the local consumption, and with respect to the probability of its ever being exported to foreign countries, it is enough to say that it is generally insipid to European taste, and in many cases actually nauseous. In the hilly country which bounds Ssŭ-ch'uan on the east, a variety is grown which possesses a good reputation among the natives, but the quantity is small. The eastern provinces already furnish more tea than the

* Reprinted from the Supplement to the 'Gazette of India,' No. 45, November 8, 1879. Calcutta.

foreign market demands, and there seems reason to doubt whether even that demand will be maintained in the face of the superior and acknowledged excellence of Indian teas.

There is, however, one point of great and increasing interest in this connexion, viz. the export of Ssŭ-ch'uan tea into Tibetan countries. A good deal has been written, without much circumstantial foundation, on this subject, in support of a project for supplying Tibet with Assam teas. The matter resolves itself into the consideration of route, quality, quantity, and price—subjects on which I have collected some fairly precise information.

The area on which tea for the Tibetan market is grown, and of which the city of Yachou may be considered the centre, as it is also the head-quarters of the manufacture, includes six or eight districts, of which the chief are Hung-ya, Ming-shan, Ch'iung-chou, Lo-shan, and Yung-ching, covering roughly about 2500 square miles. The trees are grown on the hill-sides or in the hedgerows of the fields, and, though abundant, are not conspicuous; indeed it requires a search to discover them, round Yung-ching at any rate, among the thick brush which covers everything but the cultivated fields. They are scrubby and straggling plants, very different in appearance from the carefully tended bushes of Eastern China, and are allowed to attain a much greater height, reaching to nine or ten feet, perhaps, on the average. The coarser leaves are about 2½ inches long. I could not discover that any care is devoted to them; but they seem to require very little, as far as the mere health of the plant is concerned, and not the excellence of the leaves. The native belief, that they are liable to injury from the attacks of certain boring insects, is probably erroneous. Insects rarely attack any species of tree unless it is already diseased.

Mr. T. T. Cooper's experience of the Yung-ching tea-plants is much the same as my own. "Unlike that which produces the tea exported to Europe," he writes, "it is a tall tree, often 15 feet high, with a large and coarse leaf. Little care is bestowed on the cultivation. It is often planted along the borders of fields and homesteads, each farmer gathering his small crop of tea, and finding a ready sale for it in Yachou to merchants who pay the Government enormous sums for the monopoly." This account contrasts strongly with the same traveller's description of the tea plantations *below* Yachou, where, he says, the best brick-tea for Tibet is grown. "The whole country formed a series of large gardens, without a single fence to divide the different plantations, and kept in the most scrupulous order, the trees, which stood about four feet high, being neatly trimmed, and planted in rows four feet apart. The numerous homesteads which were visible were surrounded with belts of large tea trees, growing to a height of 12 to 15 feet." I passed through the same country, but was not so strongly impressed with the extent of the cultivation; but in any case, the Tibetan tea-trade draws a very small contribution from trim plantations, but is supplied from shrubs which are left pretty much to themselves, and for all the traveller can see might be wild plants.

They yield tea available for the market in the fourth year of growth, and for many subsequent years. The harvest is ready in the end of June, and there are three pickings; the best is the young upper leaves from trees of all ages, the second consists of the leaves of young plants, and the third includes everything else that can be spared, being mostly twigs and sticks, with a scant proportion of coarse foliage. The Chinese are epicures enough to retain all the first quality for themselves, and most of the second, asserting that the Tibetans—whom, by the way, they regard as savages—would not appreciate them. The tea of Tibetan consumption consists, therefore, almost entirely of the merest refuse. I saw great quantities of this being brought in from the country on the backs of coolies in bundles eight feet long by nearly a yard broad, and supposed it to be fuel; it looks like brushwood, and is in fact merely

branches broken off the trees and dried in the sun, without any pretence at picking. It sells in Yung-ching for 2000 cash a picul at the outside, and its quality may be judged from a comparison of this price with that of the common tea drunk by the poorer classes in the neighbourhood, which is about 20,000 cash a picul. It is therefore no exaggeration to say that the tea of the Tibetan market is ten times worse than the worst tea in China.

Having purchased this tea brushwood, the manufacturers proceed to make it up for the ignorant Tibetan, as they themselves call him. The leaves and twigs, already sun-dried, are steamed in a cloth suspended over a boiler. The mould stands close by, four stout boards set up on end and secured with bitts, the interior having a section of about nine inches by 3½. Inside it is placed a neatly woven mat basket, somewhat smaller in section than the mould; the steamed and softened leaves with the finer twigs are dropped into the cavity by small quantities at a time, and a little rice-water being added to agglutinate the mass, it is consolidated, layer after layer, by forcible blows from a wooden rammer shod with a heavy iron shoe. The coarser sticks are dried and ground to powder, and interspersed *ad libitum* among the conglomerate of leaves and twigs. The basket being flexible, and a little smaller than the mould, keeps the cake from taking the angular shape which it would otherwise assume; the corners being rounded off, it is less liable to injury from the hard knocks it will have to encounter on the road to Tibet. The mould is taken to pieces, the cake, with its mat envelope, is brought back to the fire over which its composition was originally steamed, and when it is thoroughly dried, the ends of the envelope are closed up, and the long narrow package, called a *pao*, is ready for transport to Ta-chien-lu. This was the process of manufacture as I saw it conducted in Yung-ching. The cake thus formed is fairly dense when it issues from the mould; but the drying and the casualties of the road considerably loosen its consistency; and as the tea is weighed in its steamed condition, the theoretical weight is much reduced when it is dried. The quantity of wet tea in the Yung-ching packages is fourteen catties, which diminish to about eleven. The Yachou cakes are longer, and weigh, or purport to weigh, eighteen catties in the saturated state. On arrival at Ta-chien-lu the cakes are cut into portions which then receive the name of "bricks" (*chuan*) and are repacked. "Brick," however, is hardly an appropriate term. They are rather clods of not very closely matted foliage some nine or ten inches by seven, and three inches thick, containing a good deal more stick than leaf.

The best kind of tea, Mr. Cooper was informed, "is spread in the sun till slightly withered, and then rolled with the hand until moist with the exudation of the sap. In this state it is rolled into balls about the size of a large tea-cup, and laid up until it ferments. It is then ready for the wooden brick moulds." I heard nothing of this, but there is no reason for doubting the credibility of Mr. Cooper's informant. Such a preparation must, however, be rare and exceptional.

The packages are conveyed to Ta-chien-lu by tea-porters or on mule-back. A porter carries twice as much as a mule, but a mule travels a good deal more than twice as fast as a porter. The man's burden is arranged on a light wooden framework disposed along the whole of his back, and rising in a curve over his shoulders and high above his head, the structure being supported by a couple of slings, generally made of coir, through which his arms are passed. The great weights that can be carried in this manner are certainly astonishing. Von Richthofen writes, "There is probably no road in the world where such heavy loads are carried by man across high mountains. Six or seven pao is considered a small load; ten or eleven is the average; and, incredible as it may appear, I have seen frequently as much as thirteen carried by one man. I was assured that some men carry eighteen pao, or 324

catties." I have several times seen eighteen pao carried by a single porter, and on one occasion I overtook a rather slenderly built carrier freighted with twenty-two of the large Yachou packages. Although a pao weighs, in reality, considerably less than 18 catties, this man must have had, at the lowest computation, more than 400 English pounds on his back. I noticed that the greatest burdens were carried, not by the most muscular men, but by those of the straightest conformation; and that these porters, in spite of their excessive loads, suffer less from varicose swellings than ordinary chair-coolies. Laden thus, they take a rest after every few hundred yards' progress, and as it would be impossible for the carrier to raise his burden if it were deposited on the ground, he carries a kind of short crutch with which he supports it, without releasing himself from the slings. Travelling six or seven miles a day, and resting in the inns at night, these porters toil with their prodigious loads over two mountain passes, 7000 feet above their starting place, along a rudely paved road, where every step of the way must be picked, making the 120 miles from Yachou to Ta-chien-lu in 20 days or less, and receiving from 250 to 300 cash a day according to the number of packages they carry. The manner in which the loads are disposed is well depicted in an illustration to Mr. Cooper's work, but the packages are larger, and the burden much more top-heavy than he has represented them.

Inquiries into the quantity of the export are involved in much difficulty on account of the variation in the weights of the different packages. The best approximation *to the total production* is made by taking as a basis the number of permits (*yin*) issued annually in Yachou and Yung-ching. Three hundred cash is the duty paid for each permit; in Yachou a permit has to be taken out for every five packages; in Yung-ching for every six. The annual Yachou issue of these passes is about 80,000, and that of Yung-ching 60,000, giving 400,000 and 360,000 respectively as the total number of packages. The Yung-ching packages contain nominally between 14 and 15 catties of tea, and those of Yachou between 17 and 18 catties; but they have been gradually scamped until a brick of 60 nominal ounces now only weighs 44 ounces or less. Applying this correction, we obtain a total export of nine million catties, or twelve million English pounds. But this is merely a rough estimate, since the number of permits could only be ascertained within 15,000 or 20,000 of the truth, and they possibly do not represent the Tibetan trade alone; a good deal of the Yachou tea in all probability finds its way northwards to the districts round Mu-p'ing by other routes.

I obtained more precise figures in Ta-chien-lu. By a series of inquiries among the traders I learned that the annual duty-paying export lies between 500,000 and 600,000 packages of four bricks each; the mean of these gives 2,200,000 bricks.

The duty-paying unit in Ta-chien-lu is the "load," of six packages, nominally weighing 96 catties. I ascertained indirectly from the customs that duties were collected in 1877 upon 108,000 loads, otherwise 2,592,000 bricks, agreeing perfectly well with the traders' estimate. This result may be accepted with full confidence.

Precision must not be expected in the reduction of bricks to pounds. Leaving out of question the superior and exceptional teas, which form an infinitesimal fraction of the whole export, there remain only two qualities, or rather prices, although there are several kinds. A brick of either of these weighs, theoretically, 60 Chinese ounces; but actually the better quality only balances from 55 to 60 ounces, and the other from 42 to 45. The obstacle to exactness lies in the impossibility of knowing what proportion the export of large bricks bears to that of the smaller. I was assured that it is "as two to eight," but have no means of checking the

statement. Accepting it, however, for want of a better, this will give us the total Tibetan export from Ta-chien-lu to Batang almost exactly ten million English pounds, which, at the prices given below, are worth in Ta-chien-lu Rs. 1,814,400, or say 160,000*l.**

An addition of no great importance should perhaps be made for the tea which escapes the payment of duty. The smuggled total cannot be great, since there is but one route to Ta-chien-lu, closed in as it approaches the town by steep mountains covered with perpetual snow. But there is an item, too considerable to be altogether neglected, which enters Tibet as part of the baggage of officials, and which escapes all duties except those on the permit. Other goods, such as silk, also cross the frontier in this way; but it is mostly by means of tea that the Chinese resident officials feather their nests. Of these administrators and their gains, the Tibetans say, "They come to our country without trowsers, and go away with a thousand baggage-yaks."

At Ta-chien-lu the tea passes into Tibetan hands, and being wrapped, like all Tibetan goods, in skins, is conveyed on pack-saddles to Batang. The saddle is a much lighter contrivance than the cumbrous framework employed by the Chinese, and is probably equal in efficiency to any that has been invented. Two light boards, not more than 14 inches long, thickly padded with cloth and felt, are connected by two wooden bows. The girth is drawn close to the fore-legs, and a breasting which lies very low down on the animal's breast, is made fast, not to the saddle, but to the girth. A breeching, lying still lower than the breasting, is also connected with the girth; but in addition to this the saddle-boards are secured to a crupper consisting, in the cases I saw, of a straight stick a foot long, although the Tibetans employ for riding ordinary cruppers covered with soft leather.† From the bows, which stand high on the animal's back, loops of hide depend, and the packages are inserted into these, or unshipped, almost in an instant. The saddle and all its appurtenances, weighed by myself, balanced sixteen English pounds, which does not of course include the numerous layers of sheep-skin saddle-cloth. The boards are nearer together, and consequently lie much higher on the dorsal ridge than in the European arrangement. They will fit any animal, being equally adaptable by a judicious disposition of saddle-cloths to the prominent chine of a donkey, or the rotund hump of a yak. One advantage claimed for the system of suspending the packages in loops is that, if the burden strikes a projecting rock or other obstacle in a dangerous pass, it becomes detached, and falls down the precipice without overbalancing the animal. A horse, mule, or yak carries by this means a load not exceeding 160 lbs.; a *dzo*

* There must be some mistake or misprint here. According to Mr. Baber's figures, the number of better class bricks will be $\frac{2}{10}$ of 2,592,000, or 518,400. These weigh from 55 to 60 Chinese ounces each; say 57½, which will give the total weight of the better class tea 29,808,000 Chinese ounces or 1,863,000 catties, equal to 2,484,000 English pounds. The number of inferior class bricks will be $\frac{8}{10}$ of 2,592,000, or 2,073,600. These weigh from 42 to 45 Chinese ounces each; say 43½, which will give the total weight of the inferior class tea 89,164,800 Chinese ounces or 5,573,425 catties, equal to 7,431,233 English pounds. The total weight in English pounds will therefore be 2,484,000 + 7,431,233, equal to 9,915,233, or as Mr. Baber says, almost exactly 10 millions.

The value of the better class tea, however, will be 2,484,000 lbs. at 3·4 annas, 527,725 rupees. The value of the inferior class tea will be 7,431,233 at 2·7 annas 1,254,021 rupees, and the total value of the two classes will be 527,725 + 1,254,021, equal to 1,781,746 rupees. Taking the rupee at 1*s.* 8*d.*, this would amount to 148,479*l.* —[W. G.]

† The straight stick was the invariable form of crupper noticed by me in this country.—[W. G.]

is capable of supporting 240 lbs. The dzo is a hybrid between a cow and a yak, and is a much larger beast than his sire. The yak's forehead is round; that of the dzo is flat; his horns are larger and his tail longer and less hairy. He costs three times as much as a yak. The male dzo is the ploughing animal of Tibet. The female yields a greater quantity of milk than any other bovine, and the butter, which keeps good for a whole year, is the best for making tea—a fact which will palliate this digression.

The manufacturer is of course not necessarily, nor I believe often, the exporter. The comparison of expenditure and profit runs thus, taking four bricks of common tea as the unit:—

| | Cash. |
|---|---|
| Eleven catties of leaves, &c. .. .. .. .. .. | 200 |
| Dues on permit .. .. .. .. .. .. .. | 50 |
| Dues at Lu-ting Bridge and Ta-chien-lu .. .. | 36 |
| Freight from Yung-ching to Ta-chien-lu .. .. | 320 |
| Preparation and packing (say) .. .. .. .. | 100 |
| | 706 |
| Sale at Ta-chien-lu .. .. .. .. .. .. .. | 1240 |
| | 534 |

A brick of the common tea, which forms about four-fifths of the whole trade, weighs from 42 to 45 Chinese ounces, or say 60 English, and sells in Ta-chien-lu for Tls. 0·2, and in Batang for Tls. 0·32 or one rupee. The better quality weighs 76 English ounces, costing one rupee in Ta-chien-lu and Tls. 0·45 in Batang. In other words, the price in annas per English pound is—

| | Ta-chien-lu (annas). | Batang (annas). |
|---|---|---|
| Better quality .. .. .. .. .. | $3\frac{4}{10}$ .. .. | $4\frac{7}{10}$ |
| Common ditto .. .. .. .. .. | $2\frac{7}{10}$ .. .. | $4\frac{3}{10}$ |

I was told that Lhassa prices are about double those of Batang. From Ta-chien-lu to Batang there are eighteen stages, and from Batang to Lhassa forty-six. Any deviation from this main route increases the price enormously; at Yerkalo, for instance, which is only seven stages or so from Batang, but not on the high road, tea is as dear as in Lhassa.

Mr. Cooper was widely misled on these points. He evidently deduced his prices per pound from the cost of a pao, having understood by that term one of the ordinary packages of 18 theoretical catties. But the pao, by which permits are issued, and tea is sold and quoted, is five large packages. Mr. Cooper's results * are consequently five times too great. Prices were much the same in his time as at present.

It is probable that most of the tea which leaves Ta-chien-lu is paid for in rupees, as the export of Tibetan woollens cannot do much more than balance the supply of cotton cloth and silk. The rapid influx of these coins during the last fifteen years is remarkable; before that period they were rare, but have now become the currency of Tibet, and are counted, instead of being valued by weight. Great quantities are melted down by the Chinese in Ta-chien-lu, the Tibetans being unable to reduce them. Mr. Cooper alludes to the practice of melting them in Lhassa, but we know from Abbé Huc that the smiths of that city are Nipalese or other foreigners. On my asking a Tibetan why it was necessary to melt them down at all, he replied

* This refers to page 410 of Mr. Cooper's 'Pioneer of Commerce'; but what he there writes conflicts with his previous remarks on page 173.

that if they did not do so, they would have no use for such an immense quantity. It is clear that there must be a trade of no small proportions between Tibet and India. For exchange with Chinese silver in Ta-chien-lu, the rupees are weighed against the silver, and two rupees are added for every ten Chinese ounces. Russian roubles are beginning to put in an appearance, but only three of them were found in a payment of 1800 rupees.

A coin is called in Tibetan *tchran-ka*. Rupees are called *Pei-ling tchran-ka*, i. e. English coins; the derivation of *Pei-ling* is unknown. Another name is *Pei-ling ngo-mu*, i. e. English woman-face. Georgian and Victorian rupees are distinguished as *p'o-tu* and *mo-tu*, meaning male-head and female-head. Those which bear a crowned presentment of Her Majesty are named *Lama tob-du* or vagabond Lama, the crown having been mistaken for the head-gear of a religious mendicant. The same coin is known to the Chinese as *Lama-t'ou*, Lama's head, doubtless a corruption of the Tibetan.

Before the introduction of rupees, tea-bricks were used as currency, and even now in Batang a brick of ordinary tea is not merely worth a rupee, but in a certain sense *is* a rupee, being accepted, without minute regard to weight, just like the silver coin, as legal tender. Since the influx of rupees this tea-coinage has been very seriously debased, having now lost 25 per cent. of its original weight. The system of a double monetary standard is approaching its end, at any rate in Tibet. For in May last the Lamas of the Batang monastery having hoarded a great treasure of bricks, found it impossible to exchange them at par, and had to put up with a loss of 38 per cent.

To the Tibetan, tea is more than a luxury; it is an absolute necessary. Deprived of the costly, but indispensable, astringent, he suffers from headache, grows nervous, restless, out of condition, and altogether unhappy. In outlying districts, mothers are careful to keep the seductive beverage from their children for fear lest they should grow up unable, on occasion, to go without it. And yet, to European taste, the infusion, as prepared by Tibetans, is the remotest possible imitation of tea.

The Tibetan tea-pot is a wooden churn, much like a butter-churn, into which the boiling infusion is poured through a strainer; a little salt is added, and some twenty strokes applied with a dasher pierced with five holes. A lump of butter is then thrown in, and the compound is again churned with from 100 to 150 strokes, administered with much precision and regularity. The tea is then ready for drinking. It will be remarked that, with the substitution of salt for sugar, the Tibetan preparation is of much the same composition as the tea drunk in England; but the presence of the salt is not perceptible, and with the best intention in the world I could detect no flavour of tea. It is impossible accurately to describe the taste of the infusion; but to force a comparison, it is something like weak English tea with rich milk, but without any sugar or *tea*. And yet nobody would mistake it for milk and water, still less for butter and water; for the tea principle affects the flavour, while itself becoming modified into some un-tea-like astringent.

It is evident that astringency is the property desired, seeing that the many thousand Tibetans who cannot afford tea use oak bark in its stead.

The tea-cup of the Tibetan is a wooden bowl, not seldom an object of high price and elaborate workmanship, cased in precious metals and encrusted with jewels. In this he allows the tea to stand for a minute or two, and when the butter floats freely on the surface, he blows it off into another bowl. The national farinaceous food is *tsampa*, flour of grilled corn. The consumer takes up a portion of this between the tips of his fingers and thumb, and opening them with a jerk flicks it over the butter; then moulding it into consistency, he eats the immature pie-crust without further formality, washing it down with the tea. This is the characteristic nutriment

of Tibetans. Two English pounds of butter and ten ounces of tea are a liberal, but not lavish, allowance for twenty drinkers for one day.

As far as Batang is concerned, there is little prospect in all this of an outlet for Indian tea; but it is difficult to conceive how the idea of trading between Assam and that place could ever have been conceived. It possibly arose from an impression that Batang is a Chinese city, whereas it is a small Tibetan town of 200 houses, eighteen days distant from the true Chinese border by a track which, practically closed in winter, crosses four passes at various elevations between 14,000 and 17,000 feet, according to the careful and corrected observations of Captain Gill. Moreover, when the Chinese border is reached at Ta-chien-lu, the nearest city of any importance, namely, Yachou, is still seven or eight days distant, and has water communication with the sea. Setting aside, for a moment, the Tibetan roads, the only practicable way from Assam to Batang is across the Patkoi Hills to Burmah, thence into Yünnan by the Sawaddy track, and so northwards by Weisee, a distance of 750 miles,—a two-months' journey at least in such a country, whereby on arrival at Batang the freight alone, calculated at Tibetan rates, would be half as much again as the market price of Chinese tea.

The most direct road would of course be through Tibetan territory; but if Tibet be open, what purpose can be served by going to Batang? That town is a junction of high roads to Ssŭ-ch'uan, Yünnan, and Lhassa, and is consequently a point of great political importance to the Chinese Government. But its sole commercial significance worth the name, although there is a good deal of peddlery, is derived from the passage through it of Yerkalo salt and Yachou tea on their way westwards. Now Assam is admirably placed for taking this tea-trade in flank, and might even supply Western Tibet, without seriously affecting the Yachou export, since the whole quantity of the latter would only suffice for the consumption of a million Tibetans. The difficulty of crossing the Himalayas may be adduced as the most obvious impediment; but if any track whatever exists—as we know it does—it cannot be more formidable than the icy passes encountered by Abbé Huc on his journey from Lhassa to Ta-chien-lu by the Chinese tea-route.

The prices above quoted of about half a rupee per lb. in Lhassa do not, perhaps, at first sight appear to hold out a very encouraging promise of a direct tea-trade from Assam to Tibet; but, as already remarked, the price rises in a ratio altogether out of proportion to the distance of the market from the tea-route, and very quickly reaches a figure which puts the article beyond the purchasing power of the country people. This state of things arises not from the difficulties and dangers of the bye-roads so much as from the policy of the Lamas, who, being the traders and money-lenders of the country, and the only capitalists, have many motives for confining the traffic in a channel which they can most easily direct to their own advantage. They make greater and steadier profits by restricting the trade to one main line, along which they can monopolise it, than they could by opening new markets in districts at a distance from their lamaserais, where it would be liable to stray from their command. This they can the more easily effect, because the supply of tea is far inferior to the demand, and because it is not subject to much fluctuation. Mr. Cooper writes very strongly on these points, and frequently recurs to them—"The whole business in life of the Tibetans seems to be to procure a sufficiency of tea; and it is no cheap luxury; for the Lamas, keeping in their hands the retail, as the Chinese do the wholesale, trade, by this means reduce the people to absolute dependence on them, exacting in return for the precious article labour and produce. Grain, yaks, sheep, horses, and even children, are given to the rapacious priesthood in payment for tea." This statement may appear to be tainted with exaggeration, but it accords pretty exactly with the account I have received, among others, from an

apostate Lama. Under such circumstances, it will be admitted that the free circulation of tea-bricks is not likely to be encouraged. The practice of hoarding tea in the lamaserais is, by itself, sufficiently convincing. It may be taken as certain that the vast majority of Tibetans are unable to procure tea, or at any rate enough of it; that they are eager to purchase it; and that they would pay for it prices of which half a rupee may be regarded as the minimum; moreover, that the districts where it would sell most easily and advantageously are those which are furthest removed from the Chinese tea-route, or, in other words, those which are nearest to Assam. It is superfluous to remark that the merest sweepings of the Assam godowns would make better tea than the Tibetans have ever drunk.

In a few years' time, when Tibet has been opened, we shall begin to ask one another how it came about that the most powerful and progressive of Asiatic empires should have suffered the long frontier of its most flourishing provinces to be completely closed for so many years to the passage of any individual of the governing race, and that not by a formidable rival but by one feeble Tibetan State, for there are many Tibetan States besides Lhassa-dé. It is generally assumed that the obstacles to intercommunication are of a physical nature; but if so, there would be no trade, whereas evidences of a very extensive exchange abound, even so far east as Ta-chien-lu, in the use of rupees and of many articles of Indo-European origin. To mention some of the more trivial—but on account of their very triviality the more convincing—instances, the common dinner-plates of the Tibetans, when they use any, are of tin, stamped in the centre with an effigy of some European celebrity. In those which I examined I recognised the third Napoleon, the Prince and Princess of Wales, and Mr. Gladstone, all supposed by the natives to represent Buddhas of more or less sanctity. Round the rim of the plate, in all cases, were stamped the letters of the English alphabet, from A to Z.* The most desirable buttons, again, are four-anna pieces, and so strong is the demand, that three of these are worth a rupee. British army buttons are as common as blackberries.† Even corkscrews are offered for sale in Ta-chien-lu, although no one can explain their use. The presence of such miscellaneous and cheap articles testifies to the facility of trade, while the great quantity of rupees proves its extent. But although commercial intercourse crosses the whole breadth of Tibetan countries, diplomatic relations have not yet penetrated to the nearest of them, Lhassa-dé. Yet the distance from Calcutta to Lhassa, in a direct line, is less than from Paris to Berlin. Until such relations are established and maintained, there can be no hope whatever of a Tibetan market for Assam teas. Exploring missions, no matter how well organised or amply furnished, can effect nothing in the interest of trade, so long as the adverse influence of the Resident Chinese Legates and of the Lamas is unchecked. No matter how short the route, or convenient the road, the hostility of these two parties would be roused to the utmost against any project for a tea-trade. Even if the goods were admitted, which is in the last degree improbable, they would be burdened with such a weight of Tibetan dues and Chinese Likin, that the British frontier would be almost the limit of profitable sale. But if the opposition were kept within fair and reasonable bounds by the exchange of a convention and the introduction of diplomatic machinery to give it effective action, the Tibetans, with their fondness for tea and their dislike of Chinamen, would be the first to welcome the best wares to the best market by the shortest road.

In the mountainous region west of Kiating I discovered two kinds of tea of so unexpected a nature that I scarcely venture to mention them. In the monasteries

* These were noticed by me near Batang ('River of Golden Sand,' ii. p. 209).—[W. G.

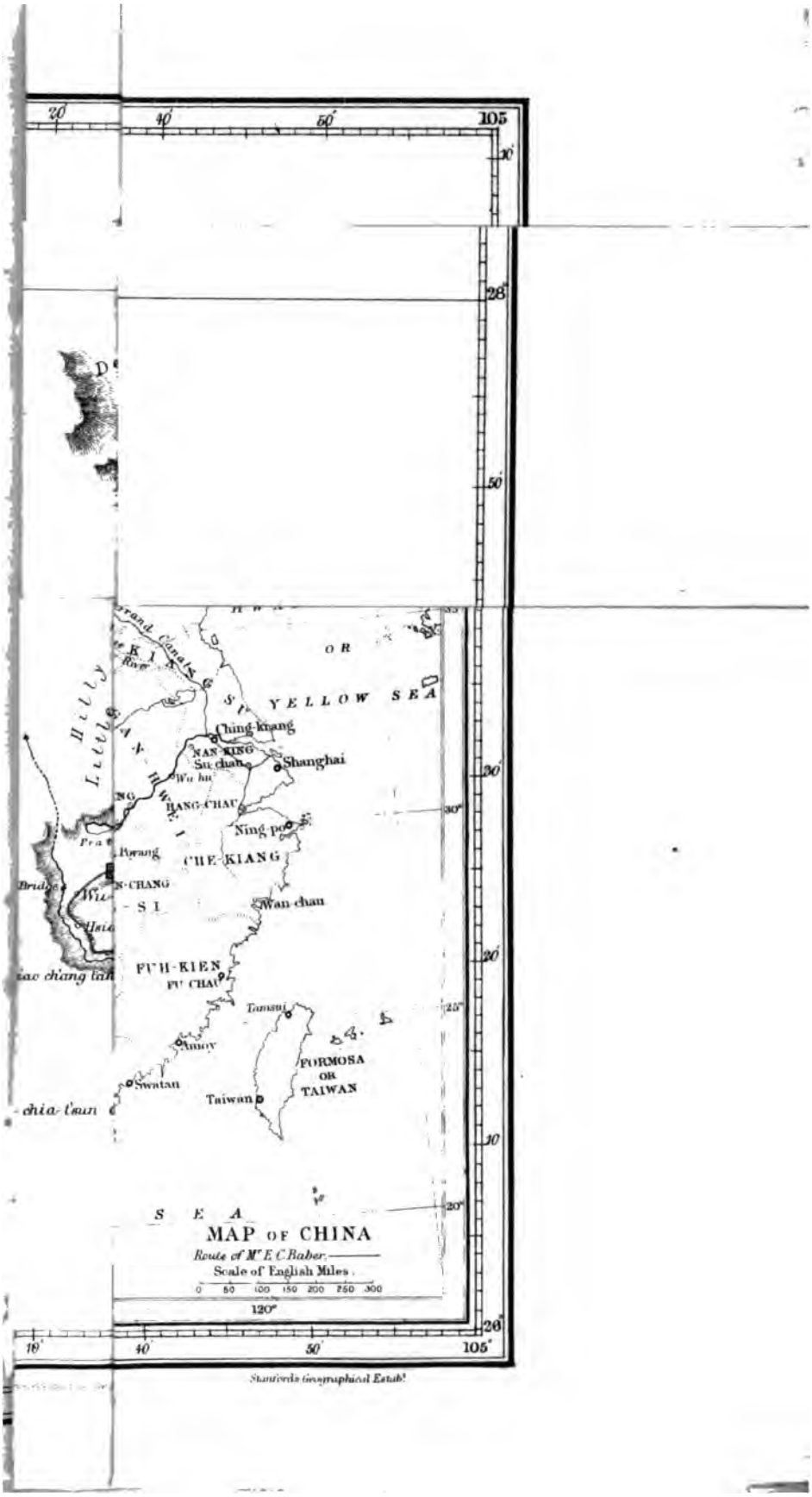
† See also 'River of Golden Sand,' ii. p. 132.—[W. G.]

on Mount O-mi, or as it is locally named, for brevity's sake, Mount O, I was regaled by the monks with an infusion of tea which is naturally sweet, tasting like coarse congou with a plentiful addition of brown sugar. It is only grown on the slopes of the mountain, and by the monks; two days' journey further west no one had even heard of its existence. I did not see the plant growing, and it is just possible that it is not tea at all; the prepared leaf, however, has all the appearance of tea, and no one on whom I have tried the experiment has taken it for anything else, or remarked upon its peculiarity, beyond inquiring why I put so much sugar in it. I am forwarding a specimen to Shanghai, without giving any hint of its singularity, for professional examination, in order that a tea-inspector's report may be appended to these notes.

The other variety, preposterous as the statement may appear, has a natural flavour of milk, or perhaps more exactly of butter. What is more interesting than this oddity is the fact that it is wild tea, growing in its native elevated habitat without any aid from human cultivation. An unimpeachable instance of a wild tea-plant has never yet been adduced in China. It has been supposed to occur in Formosa, but the specimens I found in the north of that island had evidently strayed from cultivation. The practice of drinking an infusion made from the wild plant has, I believe, never been met with anywhere. The wild tea in question is found in the uninhabited wilderness west of Kiating and south of Yachou, at heights of 6000 feet and upwards, and was described to me as a leafy shrub 15 feet high, with a stem some four inches thick. The wild mulberry is found in the same locality. Every part of the plant, except the root, is used for making the infusion. The wood is chopped up and put into a kettle of water with the dried leaves and twigs, and being boiled, yields a strongly coloured but weak tea, possessing a buttery flavour which gives it a certain resemblance to the Tibetan preparation. It cannot be obtained in Yachou. The only place where I found it in use is the Huang-much'ang plateau, a terrace perched among the stupendous gorges of the T'ung river. I only brought away a small quantity, which unluckily was drunk by mistake; but I hope next summer to make a general botanical expedition to the district, when it will be easy to procure a plentiful specimen.

E. Colborne Baber.

Chung-Ching,
*25th January*, 1879.


105°
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YELLOW SEA
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Wan-chau
FUH-KIEN
FU CHAU
Tamsui
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Swatau
Taiwan
FORMOSA
OR
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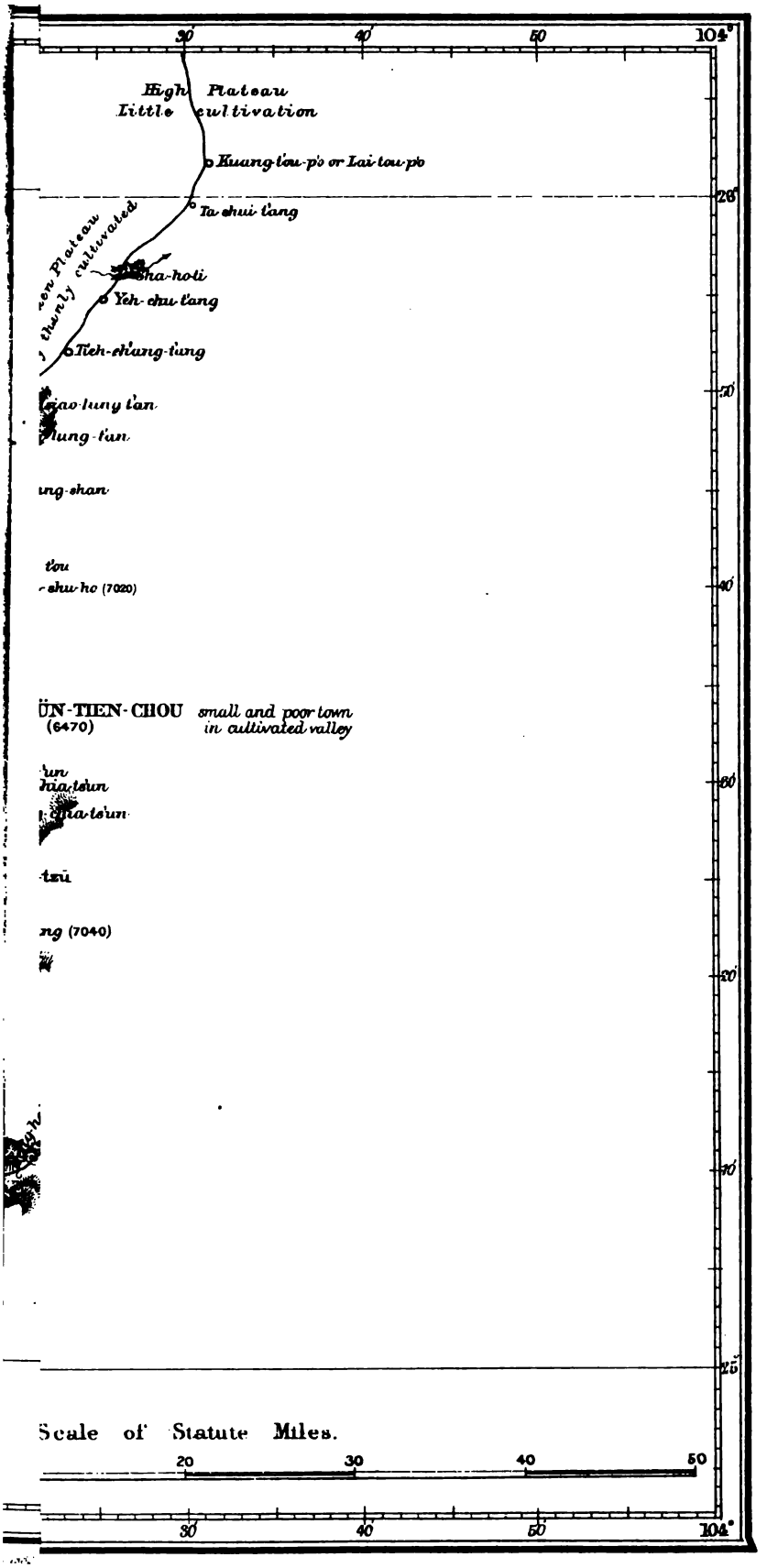
S E A
MAP OF CHINA
Route of Mr E C Baber.
Scale of English Miles.
0 50 100 150 200 250 300
Stanford's Geographical Estab!


20
40
50
104°
High Plateau
Little cultivation
Kuang-tou-p'o or Lai-tou-p'o
Ta-shui-t'ang
Yeh-chu-t'ang
Tieh-ch'iang-t'ung
ÜN-TIEN-CHOU (6470) small and poor town in cultivated valley
(7020)
(7040)
Scale of Statute Miles.
20
30
40
50
104°

# RECENT GEOGRAPHY OF CENTRAL ASIA;

## FROM RUSSIAN SOURCES.

By E. Delmar Morgan.

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# NOTES

ON THE

# RECENT GEOGRAPHY OF CENTRAL ASIA;

## FROM RUSSIAN SOURCES.

By E. Delmar Morgan, F.R.G.S.

**Map, p. 338.**

A few words of explanation, or rather of apology, are necessary for the delay that has attended the publication of the following matter.

About a year ago M. Maief's report of his journey to Hissar in 1879 was translated for the Society. This was printed and a map commenced to illustrate it. But while in progress it was suggested that better cartographical material might be obtained than any we possessed. Reference was accordingly made to St. Petersburg, and shortly afterwards a map of Russian Turkistan was received from General Ilyin's establishment on sixteen sheets, scale 40 versts to the inch, giving the results of recent surveys in the Upper Oxus regions. On comparing it with the work in hand it was found to contain many more details and to differ so widely that it was decided to begin afresh as the most satisfactory way of meeting the difficulty. To draw a map with requisite care and detail is a laborious and lengthy affair in the most skilful hands; to engrave it when drawn is also a tedious business. This excuse must suffice for the tardy appearance of the following notices on the recent geography of the Upper Oxus, for it became evident that to do justice to the map the letterpress would have to be entirely recast and the whole scope of the article enlarged.

### 1. General Description.

The field we have chosen for our consideration is a wide and interesting one. It includes the Zarafshan on the north, and the Panj or Upper Oxus with its northern affluents on the south—a region almost wholly filled in with mountains. From the north-east corner, where the Tian Shan throws up one of those knots or tangles of intersecting chains, to the south-west, where it dies away in the plains bordering the valley of the Amu-daria, it is nothing but a network of mountain ranges, rising in places far above the snow-line, and presenting some of the grandest

natural phenomena in the world. A Russian writer has recently compared this part of the Tian Shan to a colossal ruin, but it would we think be more appropriate to speak of it as the centre and fountain of life to the parched up plains of Turkistan, for here the Zarafshan springs from the glacier that gives it birth, here are the sources of the Surkhab the river of Karateghin, the Kafirnahan and other tributaries of the Oxus.

Not very long ago the whole of this region was unknown to modern explorers. It was only by patient and long study, by comparing all the old writers and geographers Chinese, Arabian, and Persian with those native Indian explorations of a modern date, that Colonel Yule succeeded in removing some of the obscurity which enveloped these highlands, and, in his essay to Wood's Oxus, laid down their geography in its main features with something like an approach to general truth. He whetted our desire to plunge into those dark and gloomy gorges in which, as in the cañons of North America, rivers bury themselves to reappear after many miles of subterranean course, and gave additional zest to the study by collecting a number of historical notices dealing with the past greatness of the country. The student therefore who would acquaint himself with the Upper Oxus tributaries cannot do better than read attentively the highly suggestive introductory paragraphs to Lieutenant Wood's travels. But since the publication of that work the world has not been idle. There is indeed no longer the same desire manifested by Englishmen to be first in the field of research. With the single exception of Captain (now Colonel) Trotter's journey from Kashgar to Wakhan in 1874, not an effort has been made from the Indian side to follow in the footsteps of Wood, of Moorcroft, of Burnes, of Conolly and others of that gallant band who set forth to explore the countries north of the Hindu Kush.

Times have changed, and when we look for information on Central Asian subjects it is to the Russians and their literature that we turn. On their side progress has been uninterrupted and rapid beyond expectation. Twenty years ago their frontier, which had for previous generations lain to the north of the Kirghiz Steppe, suddenly took a bound to the Syr-daria, and before Europe had time to recover from its surprise another great stride was taken, and the Amu-daria came to be regarded as the southern limit of Russian Turkistan. Parts of Bokhara were indeed allowed to retain a semi-independence, but this was a measure of prudence, for, with such inadequate numbers, Russia could not have attempted more without endangering all she already possessed. The wiser policy was pursued of preparing the highland states and bekships for eventual absorption by encouraging the Ameer of Bokhara, now a faithful vassal, to bring them under complete subjection. For this purpose, Bokharian troops, supplied with superior arms and munitions of war, overran the states of Ilissar, Karateghin, and Darwaz, overawing

the inhabitants, and carrying away their native princes into captivity at Bokhara.

Meanwhile Russian scientific explorers kept pace with the military detachments, and completed the much needed details required for the cartography of High Asia north of the Pandj. In this way MM. Severtsof, Kostenko, Oshanin, Maief, Mushketof, Regel, and others, visited Hissar, Karateghin, and Darwaz, explored the Pamir table-lands, traced the courses of the northern head-streams of the Oxus, and threw a new light on its orography. The picture they have drawn for us differs widely from former conceptions. Instead of the whole space consisting of great plateaux divided by single chains, we are introduced to an alpine region dwarfing into insignificance the Swiss mountains. We cross range after range, one higher and greater than the other, and from deep valleys look up to snow-clad peaks seeming to touch the sky. The passes are hardly if ever below the snow-line, and the traveller has to feel his way often along ledges of rock or over swinging wooden bridges many hundreds of feet above the rushing torrent. In the wider parts of the valleys we meet with the inhabitants, a brave, patient race of Tadjik, i. e. of Iranian blood, as distinct in language as they are in habits and character from their Uzbek neighbours in the plains. Only in the very highest belts bordering on the snow do we find the nomadic Kara-Kirghiz with their flocks and herds; but even they begin to feel the restraint of advancing civilisation, and surround their winter haunts with patches of cultivated ground. Such, then, are a few of the leading features of this country, which will be found fully treated of in the following notices translated from the Russian.

To begin with, Colonel Kostenko's book, published in 1880, a work compiled for military purposes, but arranged with commendable simplicity from beginning to end, has been consulted. Starting with the orography, Colonel Kostenko has described all the mountain ranges, and given particulars of each pass; he then proceeds to speak of the rivers, inhabitants, roads, &c., and in this way conveys a general idea of the country as far as his material will allow. In borrowing largely from him we desire to acknowledge our obligation. M. Oshanin's articles on Karateghin and Darwaz, giving the results of his journeys in 1876 and 1878, have been translated verbatim, and the same liberty has been taken with M. Mushketof's exploration of the Zarafshan glacier in 1880, a work which extends and corrects the survey of General Abramof's expedition in 1870, and which, combined with Fedchenko's journey to the sources of the Isfara, acquaints us with some glacial aspects of High Asia.

Some features in the physical geography call for special remark. The observer approaching from the west will find that he is continually rising, though the heights around do not show any apparent great elevation. M. Fedchenko, when he ascended the Zarafshan by the usual

route up this river, noticed at Oburdan the hills on either side did not exceed 1000 feet above the valley, though the height of Oburdan was 6000 feet, and he was therefore among mountains 7000 feet above the level of the sea.

The Alai Valley is another instance. Here the rise is very gradual from west to east. Proceeding from Daraut-kurghan (8000 feet) up the banks of the river for 80 miles, the traveller finds himself at an elevation of 11,000 feet, with nothing to mark the watershed between Eastern and Western Turkistan but a low ridge. These two instances out of many show the great absolute elevation the country attains, and the comparatively low relief of any particular part.

The passes afford another illustration of our argument. In but few cases do the peaks, when seen from the summit of one of these, appear to be more than 2000 or 3000 feet higher than the observer. The upheaval has been gradual, the whole of this part of the crust of the earth has apparently risen together, and only near the centres of subterranean activity, at the knots or tangles of chains, do we find that diversity which lends so sublime an aspect to the scenery. Rivers have done the rest of the work by hollowing out valleys, wide and open, as in the case of the upper Alai and the lower Zarafshan; narrow, deep, and rocky, like the gorge of the Surkhab below Daraut-kurghan, or that of the Zarafshan above Dashti-Kazi.

Another characteristic of the Tian Shan are the long, wide valleys, which bear the marks of having once formed great lake beds, where the water, constantly supplied by atmospheric deposits, has gradually risen till it forced an outlet on the west, burst through its rocky barrier, and drained off the lake.

The Alai Plain or valley, margined on either side by the Alai and Trans-Alai ranges, illustrates our meaning. This valley is about 80 miles in length, and covers an area of 800 square miles in extent. It begins at Bash-Alai (i. e. Head of Alai), near the source of the Kizil-su (upper Surkhab), where the Kok-su, an affluent of the Kashgar-daria, flows in an opposite direction, and ends where the Kizil-su receives its important right tributary, the Kok-su. Between these extremes the Alai measures 80 miles. Its greatest width is near its centre, where it widens to nearly 15 miles. Lower down it becomes continually narrower, till at Daraut-kurghan, where the Kizil-su enters the Isfairam gorge, its width is only two miles. Lower still, about a mile and a half, mountains press so closely upon its bank as barely to leave room for the river. There are many valleys like the Alai in the Tian Shan; that of the Tekes or upper Ili is another. The peculiar feature of the Alai is its straight course, deviating but very little from an east and west direction. Through it flows the Kizil-su or Surkhab, the "red river" of the Kara-Kirghiz and Tadjiks, taking its name from the colour of the clay composing the slopes of its marginal mountains. On the right, falling steeply down to

the river, is the Alai range, without offshoots or intermediate ridges, throwing up its crest only eight miles from the river. On the left is the still loftier Trans-Alai range, presenting a broad belt of intervening chains between the valley and its axis. The Alai is the "paradise" of the Kirghiz. Here, removed from the burning heat of the plains, free from insects, flies, and all manner of torments of the lower valleys, he can pasture his sheep and horses on luxuriant herbage, the effects of which are so wonderful that the worst-conditioned animal grows fat and strong after a fortnight's grazing. It is a steppe valley, like so many others of the kind in the Tian Shan, a valley without trees or bushes, but clothed with thick, luxuriant grass covering the surface of the plain, the slopes of the outlying hills, and some of the lateral glens. Here is found in profusion the *Lasiagrostis splendens*, growing in clumps with stalks three to four feet high, invaluable not only to the cattle, but to their Kirghiz owner. Of it he manufactures mats, which serve him in lieu of a carpet inside his *yurt* and as a protection outside against wind and snow.

The Kizil-su rises as we have said at the eastern extremity of the Alai, in lat. 39° 42′ north, and long. 73° 37′ 40″ * east of Greenwich. It flows without any windings of consequence, in a bed nearly a mile wide, by several arms which are continually shifting their position owing to the soft pliable nature of the soil. Its banks are high and steep in the lower half of the Alai, steep but not high in the upper half, and present no obstacles to travel. The widest of its arms is only 70 feet across at its confluence with the Kok-su, where the river is bridged, whilst higher up it may be easily forded, the depth not exceeding two or three feet, and the bed being hard and pebbly. Owing to the sediment of clay the water is thick and reddish in colour, but after standing for a while in a vessel it becomes perfectly clear, and is at all times wholesome to drink. Of the central Kizil-su or Surkhab, we shall have a good deal more to say when we speak of Karateghin. We now proceed to give some particulars of the Alai range.

In extent the range runs for 200 miles with an average elevation of 16,000 feet, and passes cut deeply into the range so as to be considerably below its crest. Fifteen of them are known by name: the Dungarma, Terek-davan, Shart, Archat, Koidjol-davan, Taldyk, Jiptyk, Sarik-mogol, Kindik, Tuz-ashu; beyond the limit of the map there follow westward the Kizilshime, Tengiz-bai, Kara-kazyk, Alaudin and Tarak. Six of these (Archat, Koidjol-davan, Taldyk, Sarik-mogol, Tengiz-bai, and Kara-kazyk) were surveyed during the Alai expedition in 1876.†

Separate peaks rise to a height of 18,000 to 19,000 feet above the sea,

* I cannot say if this be an astronomically fixed position, though it agrees with Colonel Walker's map. Two astronomers, MM. Skassi and Schwartz, accompanied Severtsof's expedition to the Pamir in 1877, and they probably fixed the position of the Kizil-yart Pass across the Trans-Alai range, that of the source of the Kizil-su being taken relatively.

† See Journal R.G.S., xlvii. pp. 22–47.

the more westerly parts of the range being higher than those on the east. The slopes vary, those on the north side being as a rule more gradual and ten times longer than those on the south which descend steeply to the Kizil-su.

The snow-line on the Alai lies at 14,000 feet on the north, and higher still on the south side of the range.* The glens are overgrown with *archa* or arborescent juniper (*J. pseudosabinus*) 35 feet high, growing so thickly as to resemble a forest. The upper limit of this tree according to Fedchenko, is 11,200 feet, the lower 6000 feet, a zone 5000 feet in breadth representing its vertical distribution here. Deciduous trees have a range of 2500 feet, and are rare above 6000 feet, though the birch was seen by the same observer at 8500 feet; 300 to 400 feet higher were solitary specimens of ephedra and honeysuckle, but lower down nearer the birch trees, barberry, mountain ash, roses, and willow were found mostly in sheltered places along the banks of brooks, whereas honeysuckle and ephedra preferred open slopes. In the Isfairam defile brushwood grows at 3150 feet, hence its range is much more extensive than that of trees. Wheat and barley flourish no higher than 8000 feet, and are sown by the nomads in valleys between mountains. Artificial irrigation is largely used, though in some parts cultivation entirely depends on rains. This kind of arable land is called *lialmi*. The yield is in proportion to the elevation, thus at 8000 feet wheat returns fourfold and barley fivefold.

The Alai range is pierced transversely by rivers flowing from south to north to join the Syr-daria, but some of them are exhausted before reaching it. The principal rivers are:—

1. The Sokh flows from the mountain mass of Kok-su, and is the westernmost of the rivers rising in the Alai range. About twenty streams contribute to make it up. From the village of Sokh it becomes a steppe river, and on entering Ferghana is soon drained off into aqueducts for irrigating purposes, some of its water being utilised by the town and gardens of Kokand.

2. The Shah-i-murdan rises in Kara-kazyk Pass, after which it is called for the first part of its course. Further on it is known as the Ak-su, and after uniting with the Kara-su at the village of Shah-i-murdan, it takes this name.

3. The Isfairam has its source in Tenghiz-bai Pass.

Further east are (4) the Naukat, (5) the Akbura or Turuk, (6) the Kurshab, and (7) the Tar.

The Turkistan range begins with a broad belt, in long. about 71° east, and is a westerly continuation of the Alai range. From its beginning to the meridian of the town of Ura-tiube its absolute elevation is very great, and about in the 70th meridian its peaks exceed 20,000 feet. Large

* Severtsof, who crossed it in October, fixed it at 15,000 feet. Fedchenko, earlier in the year, found it to be 14,000 feet.

glaciers are met with in its eastern part, and of these the Zarafshan is the chief. The upper end of this glacier lies near Mount Kok-su, the lower descends to 8675 feet, but we shall speak of it more fully in our translation of M. Mushketof's paper. Within the above limits the Turkistan range does not present a continuous upheaval, but is rather a series of parallel ridges rising in terraces and divided by occasional deep valleys. One remarkable depression occurs in the range in the meridian of Ura-tiube between the towns of Mitke and Aúchi, and continues as far as the road between Ura-tiube to Varziminor. This depression separates an outlying parallel ridge from the main chain. The passes across the Turkistan range are as follows:—

1. *Akhba-Rama*, near the Zarafshan glacier, leads to Kokand. This is an extremely difficult road, lying partly over icefields, and uniting with—

2. *Akhba-Tro.*—The road begins at the Zarafshan, near the town of Langlif, follows the river Tro, then mounts to the pass itself, which is only available in summer.

3. *Akhba-Vadif.*—This pass, lying above the snow-line, and also uniting with Akhba-Tro, is only fit for pedestrians. The road to it begins at Vadif, on the Zarafshan.

4. *Yanghi-Sabak*, crossed twice by the Russian troops in 1870. Its summit, crowned with a glacier, is 13,300 feet high, and the descent into the valley of the Syr-daria is dangerously steep. The troops, in ascending it towards the Zarafshan, were obliged to make use of long ropes to raise men, horses, and mules. The road begins two miles east of Tavushin, on the Zarafshan, follows a defile seven miles long by the side of a torrent to the top, and descends by a wide ravine and the deep gorge of the Hodja-Bakarga-su, known near its sources by the name of Jiti-Kupriuk, or "Seven Bridges," that being the actual number thrown across it. After leaving this gorge, which is five miles long, and has almost perpendicular sides, the road bifurcates, the eastern branch leading to the village of Lailak, the western to the town of Isfaneh, in the district of Khodjend. Between the pass and the gorge grass is abundant, and trees of various kinds are seen, such as juniper, birch, mountain ash, &c., whilst water is everywhere plentiful. The road, difficult for horses, is impracticable for camels. The inhabitants of Tavushin and Sabak have nearly all relatives in Lailak, and nomadise together in summer on these mountains. The stern, forbidding character of the scenery, one would have supposed, might have deterred human beings from resorting thither. Such is not the case, however, for in summer they congregate as thickly as ants, attracted by the excellence and abundance of the pasture lands, of which, in the Zarafshan Valley, there is a scarcity. In this way close ties are formed by inhabitants of towns who for eight or nine months of the year are separated by impassable mountains.

5. *Akhba-Yarkut.*—The pass is 11 miles from the Zarafshan. The

road leading to it begins two miles from Langar-yuz on that river, and follows the course of the Yarkut stream to the summit. Horsemen can with difficulty make use of it even in summer. The descent is by the Sarkat glen to Dinau, and beyond by the river Ak-su to Nau. A footpath leads from the Sarkat glen through Marengbel, a lateral pass to Andarak.

6. *Akhba-Hudgif* is extremely difficult, dangerous for pedestrians, and quite impassable in winter. The road to it begins at Hudgif and ends at Dinau.

7. *Akhba-Postigau-Mitke* unites the Zarafshan Valley with Ura-tiube. The road begins at Postigau, on the Zarafshan (whence it is six miles to the pass), is full of difficulties, and only practicable in summer. During winter, wild boar, which are numerous, have it all to themselves. About 15 miles from Postigau are the villages of Mitke and Hodja Mitke (in Khodjend). The descent, by no means easy, lies at first over snow and ice, then winds by a steep track between bushes and juniper to Hodja Mitke, the first settlement reached on the northern side. Here the rocks are siliceous schists in layers, with occasional quartz, sandstones, and limestones; farther down are blocks of conglomerate. From Mitke the road follows a rivulet to its confluence with the Ak-su, continuing along this river till it reaches Dokhat, where it bifurcates, the eastern branch probably leading to Nau, the western to Ura-tiube. From Dokhat the western track rises by a steep ascent to a great height, descending again on the north side and continuing to Ura-tiube viâ Mudjir without further obstacles. The whole distance from Postigau to Ura-tiube is 50 miles. South of the latter and three miles from it is a low chain of hills connected with the range dividing the Sanzar Valley from the Ura-tiube district. It stretches from east to west, and forms the southern limit of the terraced highlands on the north. On this plateau, 17 miles wide, are situated numerous hamlets belonging to the town of Ura-tiube. At Yangi-arik a chain of mountains 9000 to 10,000 feet high has to be crossed, but these are separated from the main Zarafshan range by a long valley beginning a little to the west of Mitke and extending through Ugut and Aúchi to the Aúchi-Oburdan road, which crosses it, and beyond this in a westerly direction to the highway leading from Ura-tiube to Varziminor. The length of this valley is about 20 miles.

8. *Akhba-Ugut* or *Akhba-Komadon.*—The road begins at Komadon on the Zarafshan, and follows a defile of the same name to the pass. It descends by the Tengri-ugut defile to Ugut, whence it turns west to Aúchi by the longitudinal valley already mentioned. From Aúchi it reaches Ura-tiube by the Basmandy defile. This road is comparatively easy and mostly frequented in summer by inhabitants of Ura-tiube and Matcha. By it, too, the villages near the Shahristan defile communicate with those on the Matcha.

9. *Akhba-Oburdan-Aúchi* unites Oburdan on the Zarafshan with Ura-tiube. The road from Ura-tiube to Yangi-arik, 18 miles long, is smooth, and rises gradually in a northerly direction. At Yangi-arik the defile of Basmandy begins, watered by a rivulet of the same name, which issues from the valley uniting Mitke and Aúchi, and bursts through the outermost chain of the Turkistan range. Its length is eight miles, which is therefore the breadth of the chain. On either side rise lofty precipitous mountains, composed mostly of siliceous schists, here and there disposed in horizontal layers but generally inclined at various angles and partly tilted on edge. These are common, but other rocks are to be met with. Along the western margin of the defile an aqueduct four miles long has been made, artificially supported on wooden props and various other contrivances. From Aúchi a defile leads southward to the pass. No inhabited places are met with the whole way to Oburdan. A wide but very uneven and stony path leads to the ascent, which is long and arduous to the top, 11,200 feet high; the descent to the Zarafshan is steep at first, but afterwards becomes sufficiently gradual. Near the southern end of the pass rises a brook which pours its waters into the Zarafshan, distant five miles from the summit by a tolerable road.

10. *Akhba-Ustanaki-Shamtitch.*—The road leading to it begins about a mile to the west of Shamtitch on the Zarafshan. Horsemen ride up it in summer as far as Aúchi, 12 miles. The pass is five miles from the river, and is both difficult and dangerous. From Aúchi it is easy to get to Ura-tiube and Shahristan.

11. *Akhba-Vishab.*—The road starts from Vishab on the Zarafshan, and lies up the right bank of the Obi-Vishab by a gradual and easy ascent to the pass six and a half miles from Vishab. The descent is nine miles to Aúchi, and the road is practicable throughout the year.

12. *Akhba-Shavatki.*—From Shavatki-bala on the Zarafshan to Aúchi, 16 miles by a footpath crossing the pass in a northerly direction and entering the above-mentioned longitudinal valley, uniting Aúchi, Mitke, and Shahristan.

13. *Akhba-Pahut.*—A bridle road from Pahut on the Zarafshan through a defile of the same name to Aúchi. The pass is blocked with snow and only practicable in summer.

14. *Akhba-Rarz*, from Rarz on the Zarafshan by the left bank of the Obi-Rarz rivulet, over the snowy crest of the range, descending by the Khanjei-lau glen to Shahristan defile, 21 miles. This is a mere bridle-path, very difficult, and only practicable during the summer months.

15. *Akhba-Ispan*, from Fatmi on the Zarafshan over Nau-Forgan mountain through Ispan village, descending by a glen to Shahristan defile. It is reckoned to be 27 miles by this route to Shahristan, and 18 miles from the Zarafshan to the top of the pass. There is no traffic by it except in summer.

16. *Akhba-Putkin*, from the vicinity of Taumin on the Zarafshan through Putkin glen; 11 miles to the pass, with dangerously steep ascent and descent; 34 miles altogether to Shahristan.

17. A footpath from Senkistan on the Zarafshan across the snowy range to Shahristan.

18. *Akhba-Kishkat*, unites Varziminor with Ura-tiube, viâ the Shahristan defile. Between Ura-tiube and Falgar the road is well trodden by inhabitants of the last-named town on their way to and from the bazaar at Ura-tiube. The pass is approached in two ways: first, from Kishkat up a defile of the same name, along a brook to the mountains. This is an easy route. Secondly, from Varziminor the road lies over Jobistagh Mountain, intersects the Obi-bars defile, then crosses mountains by steep and long ascents, entering Hishkat defile and joining the foregoing road about three miles above the village of Hishkat. The second is by far the more difficult of the two. The top of the pass is 10,700 feet above sea-level, and 11 miles distant from the Zarafshan.

19. *Akhba-Taumat*, from the village of Dardar on the Zarafshan to Shahristan, 33 miles. The ascent is by the Taumat-sai defile. Beyond the mountains the road, which is only practicable in summer, joins No. 18 at Kizil Mazar.

20. *Akhba-Langar*, from Urmitan on the Zarafshan to Zaamin and Ura-tiube, lies along Langar defile to a low and easy pass, whence it descends to Obi-kul defile. At the fifth mile it turns towards the east, crosses a mountain of no great height, and enters Kizil Mazar rivulet. Another low offshoot of the mountains has to be crossed before the Machit rivulet is reached. Then the road lies through Kata-shibar, rich in pasturage and trees, to the Kum-bol Pass, after ascending which the descent is by a brook to the Shahristan defile. Near Obi-kul a road branches off to Zaamin, 16 miles. The distance to Shahristan by this route is 40 miles.

It appears, therefore, that all the passes enumerated, with the exception of two, are difficult and of great height; that in the eastern part of the range they are fewer in number and higher than in that part situate between Obur dan and Urmitan; that the absolute height of the Turkistan range, very great at first, gradually diminishes towards the west. Thus the Yanghi-Sabak Pass is 13,300 feet, whilst the Shahristan is 10,700 feet. Water is everywhere abundant, and trees, mostly juniper, are not wanting, whilst at an elevation of 7000 to 10,000 feet above sea-level there are splendid pasturages for cattle.

From the meridian of Urmitan the Turkistan range stretches away in a broad belt to the north-west, filling the eastern and northern parts of the Central Zarafshan basin with hills. Near the town of Jizak it becomes much lower, though its chains continue to skirt the southern border of the Kizil-kum desert. In the meridian of Urmitan the range separates into two, forming in this way the Sanzar Valley. The southern

range accompanies the course of the Zarafshan as far as Penjakend, whilst the northern reaches Jizak, a town about 50 miles north-east from Samarkand. The road from Jizak to Samarkand crosses the lowest dip in the range. Here lies the so-called Jilan-utinsk defile, in the centre of which (eight miles from Kliuchevoi) precipitous cliffs almost meet on either side, barely allowing room for a narrow gorge known as Tamerlane's Gates. On a rock in this gorge on the right-hand side (going towards Jizak) may be seen two inscriptions dating from the time of Abdullah Khan.

On the right of the Zarafshan and on the left of the Sanzar Valley extends the ridge of Osmut-tau, barely 5000 to 6000 feet high, and much lower near the Stone Bridge Fort. North-east of this are the low Sanzar Mountains, very easily traversed. Farther westwards the range breaks up into several small chains, but these do not enter into our map, and we will therefore confine ourselves to those which do.

*The Zarafshan range*, stretching nearly due west from the mountain knot of Guibas, and parting the valleys of the Upper Zarafshan and Yagnaub-daria, is pierced in the meridian of Varziminor by the very deep and narrow gorge of the rapid Fan-daria. This part of the range is very regular and of great height. The following passes cross it serving to connect the hamlets of the Upper Zarafshan with the settlements on the Yagnaub.

1. *Akhba-Tavastfin.*—From the village of Hairabad on the left bank of the Zarafshan the road lies up the Tavastfin defile, through the summer camping-grounds of Ustan, Hukimi, and Hishkat. The top of the pass is 10 miles from the Zarafshan. The descent is by the valley of the Yagnaub-daria to Senghi-mailek, 16 miles altogether. The road winds, though it can be used in summer by horsemen, and is upon the whole comparatively easy.

2. *Akhba-Revut.*—A footpath from the Zarafshan village of Isis lies through the Revut gorge, crosses the range at the twelfth mile, and reaches Senghi-mailek on the Yagnaub three miles beyond.

3. *Akhba-Guzun.*—The road begins at the hamlet of Hodji-shar on the Zarafshan, and follows the Guzun-sai defile by the villages of Pud, Haz, Ravaz, and Guzun, entering the Yagnaub valley at Novobot.

4. *Akhba-Surkhat.*—From the gardens of Postigau near the Zarafshan, viâ Tamshin, Surkhat, and Arnagan, 11 miles to the top of the pass, which is only accessible in summer. From the summit the distance to the Yagnaub village of Tagi-Chenar is rather over five miles.

5. *Darkh Pass.*—Rather less than half a mile from the Zarafshan village of Shamtitch a road leaves the river in a direction almost due south, forming the chief line of communication between the hamlets on the Zarafshan and those on the Yagnaub-daria. In the Darkh gorge the road has to be carried along narrow cornices and balconies 300 feet above the river. At the fourth mile it enters a wide and cultivated valley

reaching to the village of Darkh, situated at the point of confluence of two rivulets. Here three roads meet, the easternmost leads over the snowy range to the Yagnaub hamlet of Bidif, the central one also crosses a snowy pass to the hamlet of Varzaut, whilst that on the west follows the narrow defile of a mountain torrent to the summit, 13,000 feet above sea-level. From Darkh it is seven miles to the top, with splendid pasturage and occasional thick clumps of poplars. The first mile of the steep ascent is over rocks, the second over snow. The descent is abrupt to the village of Kishartab in the valley of the Yagnaub. The length of this road is 16 miles in all, 14 miles from Shamtitch to the pass.

6. *Minora.*—The road leaves the Zarafshan at the village of Falmaút, and rises by the bank of a stream through a defile. At the eleventh mile the pass is covered with snow and full of difficulties; the descent is by the Luilau gorge in an easterly direction to Kishartab—16 miles—only practicable in summer.

7. *Marda-Kishtigeh.*—The road turns off the Zarafshan riparian route at Rarz, and crossing the river by a bridge leads up the Margelak defile to the pass—12 miles to the top. After five miles of descent by the valley of the Pshansa, the village of Tak-fan is reached. This road can be used for pack-animals, though not without difficulty.

It will be seen from the preceding remarks that of all these passes that of Darkh, though extremely difficult, offers the fewest obstacles to traffic. It may therefore be readily imagined how wild and inaccessible is this region. Yet even here, as in eastern parts of the Turkistan range, excellent pasturage is to be found and every requisite for summer encampments. The Darkh pass illustrates a feature generally characteristic of all these ranges, in the abrupt and steep fall of its southern slopes as compared with those on the north. The following figures will help to make this clearer to the reader:—

| | Length of Northern Slope. | Length of Southern Slope. |
|---|---|---|
| Pass of Tavastfin .. .. .. | $10\frac{2}{3}$ miles | $5\frac{1}{3}$ miles |
| „ Revut .. .. .. | 12 „ | $2\frac{2}{3}$ „ |
| „ Guzun .. .. .. | — | — |
| „ Surkhat .. .. .. | $10\frac{2}{3}$ „ | $5\frac{1}{3}$ „ |
| „ Darkh .. .. .. | $13\frac{2}{3}$ „ | $1\frac{2}{3}$ „ |
| „ Minora .. .. .. | $10\frac{2}{3}$ „ | $5\frac{1}{3}$ „ |
| „ Marda-Kishtigeh .. .. | 12 „ | $5\frac{1}{3}$ „ |

The above remark equally applies to the Turkistan range. In both chains the streams on the north side are much longer than those flowing south.

The mountains bordering the Upper Zarafshan contain coal, iron, gold, alum, and sulphur. Gold occurs throughout the course of this river in small grains and fine flakes, washed from the conglomerates on its banks, while there is none found in the more distant rocks. The poorest

of the native population are engaged in the gold industry and earn a bare livelihood by it. Alum is worked in various parts of the Fan and Falgar. Sulphur is found in Mount Chandara, near Fort Sarvad (now abandoned), and is collected from fissures of the mountain in the form of powder. The high temperature of these rocks is a fact not to be overlooked by the geologist. Four miles from Fort Sarvad up the Yagnaub are thick layers of iron ore and coal. The Zarafshan range in the meridian of Varziminor, as above stated, is pierced by the Fan-daria, and farther west by the two last tributaries of the Zarafshan, the Kshtut-daria and Maghian-daria.

*Defiles.*—The Fan defile is entered from the north near Varziminor, where the Fan-daria pours its impetuous stream into the Zarafshan. This wild and narrow gorge presents obstacles of no ordinary nature to traffic. Starting at a height of 4500 feet, it ends at Sarvad with 6300 feet, having a total length to this point of 18 miles. After following the east side of the Fan-daria the road crosses to the west by a bridge named Pul-i-mulla. The path winds among rocks, along "cornices" and artificial "balconies," supported on light wooden props, overhanging the river. The sides of the defile are full of interest to the geologist, presenting a complete section of the rocks of this range in the various sandstones, white gypsum, marble, slate, and granite, with occasional outcrops of coal.

The Fan defile unites Ura-tiube, Falgar, Fan, and leads (viâ Iskander-kul and the Mura Pass) to the valley of the Kara-tagh and to the Amu-daria. The abandoned fort of Sarvad is the point of convergence of several tracks over the mountains communicating with the neighbouring districts, and uniting the Kshtut, Fan, and Yagnaub valleys with Penjakend and Samarkand.

The Kshtut defile begins at the confluence of the Kshtut-daria with the Zarafshan, near Dashti-Kazi village, and leads southward viâ an old fort of the same name. After crossing the Hissar range somewhat to the east of Sibi-surkh Pass, the track ascends the mountains of Kara-tagh. To the west of the Fan defile the Zarafshan range borders the Shahr-i-sebz valley on the north, and throws out several offshoots to the south-west and south, no longer preserving the regularity of form characteristic of its eastern part, though still of very considerable height. The Kshtut Pass, leading from the defile of the Pasrut-daria to that of the Kshtut, is 11,650 feet high, whilst the peaks rise much higher, Mount Chandara, for instance, having an elevation of 18,300 feet.

The road up the Maghian defile begins at the village of Sudjin on the Zarafshan, and lies, viâ Sufian, over open ground as far as Charbak, where it crosses to the right bank of the Maghian-daria, entering some low hills near the village of Kostarash, and winding through a defile to the confluence of the Shink. Keeping along the right bank of the river, the track ascends Mount Vachekna, but before reaching the village of Gaisan it crosses to the left bank and approaches Maghian, viâ Hurmi. Hence

the source of the Maghian-daria is followed to the difficult pass over the Hissar range leading to Sari-jui in Bokharian territory. From the confluence of the Shink with the Maghian a route branches off in a S.S.E. direction up the Shin to the Sibi-surkh Pass.

West of the Maghian defile the Zarafshan range is separated from that of Hissar by the Shahr-i-sebz Valley, and the connection between the two is severed. The culminating point in this part of the Zarafshan range is situated in the meridian of Penjakend, 10 miles south of Maghian. Here three lofty peaks shoot up above the surrounding mountains, hiding from view Mount Hazret Sultan, 15,000 feet high. Starting from the Maghian defile, some long offshoots from the range fill in the upper Kashka-daria, while the chief mass preserves a general westerly direction. In the meridian of Urgut the mountains are still of great height, but beyond this they gradually diminish towards the west, where they may be easily crossed.

The principal passes in this part of the chain are three in number: Over *Sanghi-juman* lies the highway between Urgut and Farab, through the villages of Hish-duvan and Guss (3560 feet). On leaving Guss a succession of steep ascents, descents, and zigzags over bare rocks has to be accomplished. Immediately before reaching the pass the track descends to the bed of a mountain torrent. The pass itself is easy, though 7110 feet high, and not used in the winter months. The descent on the other side is difficult; the road lies through Musa-bazar to Farab on the Farab-daria, an affluent of the Kashka-daria. At the foot of the ascent a route branches off in an easterly direction to Maghian.

A little farther to the east another and more difficult road for horsemen leads from Penjakend to Farab, *Kara-tiube*, the highway of commerce between Samarkand and the chief towns of the Shahr-i-sebz Valley, Kitab and Shahr. Beginning at Samarkand, the road lies over the plain nearly to the village of Kara-tiube, 20 miles. Seven miles beyond is the pass, easy and practicable at all seasons. The descent is by the village of Kishlak [i. e. hamlet] to the town of Kitab, reached at the sixteenth mile from the top of the pass.

Between the ravines of Kara-tiube and Jam snow lies on the mountains only in winter, their height not exceeding 7000 feet, and sensibly diminishing towards Jam.

The *Jam* Pass is quite at the extremity of the range; beyond it mountains soon become hills, and die away in the plain. Jam Pass is most important owing to the fact of its being the only one suitable for wheeled traffic from Samarkand to Karshi and the Amu-daria; it is, too, the highway between Bokhara and the valley of Shahr-i-sebz, and is but 2050 feet high.

*The Hissar range* begins at the mountain mass of Kok-su, where it rises at once to a great height. It forms a direct continuation of the Tian Shan Mountains, and divides the valleys of the Zarafshan and

Kashka-daria from the Amu-daria. Stretching away almost due west, it touches the eastern extremity of the Zarafshan range at Mount Guibas. It then turns to the south-west as far as Haki, where it resumes its westerly direction, and continues to the Bokharian town of Ghuzar. On the east it divides the waters of the Upper Zarafshan from those flowing into the central Surkhab. Then it serves as a water-parting between the Yagnaub-daria and Iskander-daria on one side, and the rivers of the bekship of Hissar on the other. Its westerly extremity divides the basin of the Kashka-daria from the Shirabad-daria and river of Baisun. The Hissar range throws off numerous offshoots to the south; between them flow the rivers Dehemilaudal, Sorbokh, Surkhab, Kafirnahan, Zigdi, and Turpalan, belonging to the basin of the Amu-daria. The roads and passes across these mountains are:—

1. *Akhba-Yarkitch*, which unites the Upper Zarafshan valley with the river Dehemilaudal. The road turns off a little to the west of the glacier, follows Obi-kadjra defile, blocked with ice, and mounts to a snowy pass only accessible during part of summer. The road and the pass are exceedingly difficult for pack animals. The descent branches off in two directions—one east to the village of Nazar-ehilak, the other west, along the Dehemilaudal river to its confluence with the Surkhab-daria, a little south-west of the village of Sakau, 55 miles in all.

2. *Piobrut*, for pedestrians only, from the village of Dihisar on the Zarafshan by the Piobrut ravine, five miles to the summit. The pass is snowy, difficult, and only accessible in summer. After crossing the range the track lies along the Obi-Dubursa rivulet to a village of the same name 13 miles from the summit.

3. *Vadif*, also fit for foot passengers only. From the hamlet of Vadif on the Zarafshan up the defile of the same name, and across the range to the above-mentioned village of Dubursa. It is six miles to the pass and eight to the village beyond. The path lies through the villages of Didehi, Ziya-janghil, to Hodja-Chauk, 28 miles altogether.

4. *Pakshif*, for laden animals. The chief traffic between Matcha and Karateghin is by this route, and by it the people of Karateghin reach Ura-tiube. The ascent from the village of Pakshif on the Zarafshan is by a glen to the pass, seven miles. The descent is gradual, and leads to Gharm, the chief inhabited centre of Karateghin. This is the best pass from the Upper Zarafshan to the Surkhab.

5. *Novobot*, available only for pedestrians, unites the valley of the Yagnaub with Karateghin. The path also leads from the village of Novobot to the Zarafshan river, and forms a continuation of the Akhba-Guzun road over the Zarafshan range.

6. *De-balan* leads from the valley of the Yagnaub to the Kafirnihan. The route begins at the village of Debalan, follows the Vitkhan rivulet, and reaches Roumit on the other side of the pass. Distance, eight miles to the top; 20 miles farther to the village.

7. *Chukat*, from the Yagnaub to the Upper Zigdi-daria, begins near Chukat, and ascends by the Tagobi-kul ravine to the summit, nine miles. The road then runs south-west to the village of Ibol on the Upper Zigdi-daria, 12 miles from the pass, which is full of snow and difficulties.

8. *Anzob* is the best route from the Hissar hamlets to the Upper Zarafshan. It begins a little above the village of Anzob on the left bank of the Yagnaub, and follows a defile by easy gradients to the top, 12,000 feet high, and seven miles from Anzob. Three miles farther is the village of Ibol, where this route falls in with No. 7.

9. *Kshir* turns off the rivulet of this name, which intersects the Takfan-Anzob road, and follows the Jijik-rut stream. The village of Zigdi lies beyond the pass. It is six miles to the summit, and $5\frac{1}{3}$ beyond to Zigdi.

10. *Jijik-rut.*—From the same road mentioned in No. 9 a pathway separates and crosses the pass leading to the Zigdi-daria. This is the best after No. 8 to the valley of the Zigdi. From Takfan it is 10 miles to the summit, and seven miles farther to the Zigdi.

11. *Mura* communicates directly between Ura-tiube and Kara-tagh, forming a continuation of route No. 18, over the Kishkat Pass viâ Varziminor, the Fan-daria, and Iskander-kul. From Fort Sarvad pack trains may proceed along the left bank of the river for three miles to the confluence of the Yagnaub and Iskander-daria, where the road turns to the south-west and follows the course of the last-named river. At the sixteenth mile from Sarvad, a very arduous and long ascent has to be accomplished to Lake Iskander-kul, two miles south of the ascent. The track skirts its western shore and is very dangerous, though less so than that along the Fan-daria. On leaving this lake the Sara-tagh rivulet may be followed for seven miles, and laden animals pass along with ease: it then becomes more difficult, the pass itself being extremely steep and blocked with snow. Having gained a height of 12,000 feet, a descent must be made to a glacier, and this is bad travelling even for pedestrians. A second glacier, 12,200 feet high, has also to be crossed before beginning the descent, which is steep at first, then enters the valley of the Kara-tagh-daria, and through the village of Hakimi comes to the town of Kara-tagh. From the northern shore of Iskander-kul to the summit is 11 miles, and 25 miles more to Kara-tagh. From the south-eastern shore of the lake a pathway leads to the Khanaka Pass, viâ Senghi-dival ravine.

A road over the Mura Pass unites the valleys of the Kshtut and Maghian-daria with the Hissar hamlets, viâ Voru, on a river of this name, the chief tributary of the Kshtut-daria.

In describing the passes over the Zarafshan range those routes were mentioned which follow the valleys of the Kshtut and Maghian-daria and are continued southward across the Hissar range. To the west of them are others communicating between the fertile districts in the

Zarafshan Valley and Hissar. One of these was crossed by M. Maief in 1879 on his way to explore the valleys of the Vakhsh (Surkhab river) and Kafirnahan, and from his report we borrow the following particulars:—

*From Shahr to Sari-jui viâ Tash-kurgan.*—The valley of Shahr-i-sebz is bounded on the north by the Samarkand [or Zarafshan] and on the south by the Hissar ranges. The latter, considerably loftier and more massive than the former, is crossed by three roads leading from Shahr-i-sebz to Hissar. The first and westernmost is that of Ghuzar; the second, a little to the east, passes through Kalta-minar, and joins the first road six miles from the celebrated Iron Gate;* whilst the third and most difficult is that of Tash-kurgan. All three are commanded on the Shahr-i-sebz side by forts—the first by that of Ghuzar, the second by Yar-tiube, and the third by Yako-bagh.

From Shahr as far as Yako-bagh the road is level and good, passing through cultivated land for eight miles. Seven miles before reaching Yako-bagh it crosses the Kizil-su rivulet, entering the gardens of Yako-bagh about three miles from the fort. The town itself is situated on a river of the same name, at the entrance to a well-cultivated and populous valley. Its climate is extremely bad, and fevers of an obstinate character prevail, proving fatal in many cases where medicines are not procurable.

From Yako-bagh to Tash-kurgan the road lies at first along the valley of the swiftly-flowing Yako-bagh-daria, passing the villages of Samak (10 miles from Yako-bagh), the residence of an amlakdar, Ming-tut,† a rich village, Haider-bulak, on a rivulet of the same name joining the Yako-bagh-daria some way lower down, also the residence of an amlakdar, and Tatar, a group of hamlets at the foot of the mountains. Beyond Tatar a succession of steep zigzags leads to the rocky slopes of Mass-kara-koi, overgrown with arborescent juniper and a variety of bushes. Nearer the summit the gradients are easier, and the road is good to the rocky, jagged crest of the mountain. Turning this ridge by the Chakman-kuida Pass, the descent begins into the Tash-kurgan Valley, on the northern slope of the Hissar range. This descent is at first easy, but afterwards becomes more difficult, as the road is a mere track, narrow, and covered with loose stones, continually winding between projecting crags along the verge of precipices, and so steep that equestrians hardly dare ride down it, and usually dismount. This leads

* The following appears in the Monk Hyacinth's 'Historical Records of the Ancient Inhabitants of Central Asia,' part iii. p. 247: "There is a mountain known as the Iron Gate; on either side are lofty cliffs, and the colour of the rocks is like iron. This answers the purpose of a frontier fortress to two kingdoms." But nothing is said of the folding gate bound with iron and hung with a multitude of bells, as described by Hwen Thsang. See Colonel Yule's note to Professor Lerch's article on Hissar, translated in the Geogr. Mag., vol. ii. 1875, where earlier notices will be found.

† i.e. 1000 mulberry trees.

direct to the gardens and fields about Tash-kurgan, a large highland village. Here in summer an amlakdar resides; in winter, when communications are interrupted by snow, he removes to Yako-bagh.

Tash-kurgan is well supplied with water from mountain springs; the brook of the same name (an upper feeder of the Yako-bagh-daria) flows below the village in a deep cleft, uniting with another stream, the Shud-arad-daria. The first of these rivulets is crossed by a primitive kind of bridge, the second by a ford. After crossing the Tash-kurgan-daria, the road ascends the red sandstone slopes of the Tash-kurgan mountains margining the valley. These hills have an undulating, hillocky surface, and are everywhere covered with cornfields and junipers. At length the main axis of the Hissar chain is reached at the pass of Lagar-i-murda. Two roads lead across it; the first, though shorter, is extremely difficult, the other, much better, is also hardly practicable.

In order to follow the shorter route it is necessary to turn to the right and ascend by a gradual and easy incline to the summit of the pass, marked by two pyramids. Difficulties only begin with the descent, and none but *djigits* ride down this way in their rapid journeys. Travellers mostly get off their horses and lead them by the bridle, for besides its steepness the descent is dangerous owing to frequent landslips. This leads into the bed of a small brackish stream, the Sarim-sak-bulak* (Shur-su). Then the track ascends to a level gravelly plain, continuing over it to some reddish sandstone hillocks, overgrown with juniper and forming the side of the deep bed of the so-called Sarim-saklik (Sarim-saglik, according to Rodionof), a noisy mountain torrent. This gorge opens into the still narrower Bakhcha cleft, cut by aqueous action between lofty overhanging walls of rock, almost meeting overhead, and excluding daylight from its gloomy recesses. Below rushes a stream a few paces wide, except when melting snows in spring swell its waters, when it occupies the whole width of the gorge (which is only 150 to 200 feet long) and interrupts communication.

The second more circuitous track keeps to the left of the first from Lagar-i-murda, and also leads into Bakhcha cleft. The road descends by short but very steep terraces, avoiding the deep channel with its brackish stream by means of a narrow ledge. Then it enters the Surfa range, twice crosses a valley of no great depth with excellent grass, and, by a series of gradual ascents and descents, at length enters the bed of the Sarim-saklik. This too may be turned by a *détour* westward, passing along a tolerably easy river course opening into the valley of Bakhcha-sai below the gorge where the two tracks join.

From Bakhcha cleft the road continues along the narrow Bakhcha-sai or upper Sang-gardak, supported on ledges of rock overlooking the

* Sarim-sak is the Kirghiz name for the wild onion. It grows plentifully on the Tian Shan and its ramifications, and doubtless originated the Chinese name of Tsung-ling, "onion mountains," for this range.

impetuous and boulder-strewn Sang-gardak-daria, occasionally descending to the river itself, and constantly crossing and recrossing its stream. The road is very stony and dangerous, and often ascends by steep paths to the cliffs above in order to avoid impassable parts of the river. The village of Bakhcha, not large but straggling, stands in a side glen formed by retreating heights, its huts and gardens alternating with patches of arable land occupying whatever level ground there is.

The road from Bakhcha to Sang-gardak is no better than that leading to Bakhcha from the gorge of the same name, having continually to cross the Sang-gardak-daria. This river is fordable only during the dry season, but in spring and summer bridges of the most primitive description, in fact nothing more than juniper trees, are laid across from bank to bank. The distance from Bakhcha to Sang-gardak is reckoned at two *tash* or 11 miles.

Sang-gardak is larger than Bakhcha, but like it in other respects. An amlakdar resides here, whose jurisdiction extends over the mountaineers, or Illebai Turkomans, as well as over the local population.

From Sang-gardak to the end of the pass the road is less dangerous, though in many places unsafe, where balconies * have been thrown out to widen it, or where the bed of the river is confined by cliffs, and heaps of stones, over which it is necessary to pick one's way, have been thrown into the water. Frequently, too, lofty precipices have to be scaled to avoid masses of fallen rock.

About a mile below Sang-gardak a sparkling cascade leaps down the side of the defile and keeps vegetation green, forming a welcome oasis of verdure amidst the prevailing sombre tints of the rocks. Not far off stands the hamlet of Chujak, a collection of mud hovels.

Throughout the whole length of the ravine there is a variety both of trees and bushes. The first met with are the characteristic *archa* or juniper (*Juniperus pseudosabina*), mingled with ash (*Acer tataricum*) afterwards. Standing alone lower down are willows and tamarisk (*Tamarix floridus*) covered with elegant sprays of rose-coloured flowers. After these comes a belt of mulberry (*Morus alba*) and the dense bluish-green foliage of the iron tree conspicuous amidst the prevailing lighter shades of vegetation. In still lower parts of the ravine grow apricot (*Prunus armeniaca*), wild cherry, and plum. But poplars, elms, called by the natives *karagatch* (*Ulmus campestris*), and other trees characteristic of the cultivated zone are only seen in plantations at Bakhcha and Sang-gardak, mingled with an undergrowth of thorn, Siberian acacia, *Caragana jubata*, honeysuckle of various kinds, and bushes of *Colutea arborescens*. Below these again are cherry and stunted apple trees, whilst at the very end of the ravine, near its entrance to

* A good illustration of an artificially widened road supported on wooden props along the precipitous side of a gorge is given in Mr. T. T. Cooper's 'Pioneer of Commerce.'

the plain, are a few fig trees (*Ficus carica*), with small but sweet and edible fruit.

Towards the end, where the defile widens out, the road improves, and quite at the extremity stands the village of Dagana, surrounded by gardens and fields. Six miles beyond is the town of Sari-jui, on the river Turpalan. Its citadel, like all others in Hissar, has lost all strategical importance, and is falling into ruins. Sari-jui is the residence of a bek, to whom Sari-asiya with its district and Yurchi are also subject, both these towns, formerly centres of independent bekships, being now under officers appointed by the bek of Sari-jui.

From Dagana to Sari-jui the road is throughout good and even, and there is another direct way from Dagana to Yurchi.

## 2. KARATEGHIN.

Karateghin is the mountainous country occupying the whole of the central course of the Surkhab. In a straight line it extends approximately 100 miles, with an average width probably of 25 to 30 miles. On the north and east it borders on Russian dominions, on the south it touches Darwaz, and on the west Kulab and Hissar. Its orography is very intricate, for it wholly consists of a collection of valleys, separated by numerous offshoots of the great ranges which stretch along its northern and southern borders. Besides those north of the Surkhab, there are apparently other parallel chains: one at all events follows the right bank of this river.

The northern border of Karateghin is occupied by two ranges, the Alai and Hissar, converging at the mountain knot or group situated near the upper end of the Zarafshan glacier. All recent maps, from that of Kohistan by Aminof, give the name "Kok-su" to this mass of mountains. Yet this must be an error, for so inappropriate a name as "Green Water"—the meaning of the Turki words composing the name—could never have been given to any single peak or group of peaks. But however this may be, three chains radiate from this knot—one towards the east and two towards the west. The first forms the watershed between the Syr-daria and Surkhab, and was named by A. P. Fedchenko the "South Kokandian" range, while on more recent maps it is marked "Alai-tau." But this name was found inconvenient, owing to its resemblance to Ala-tau, and therefore on the military topographical staff corps map of 1878 it appears as "Kchi-Alai," i.e. "Little Alai." This too is a misnomer, for the term is applied by the native Kara-Kirghiz exclusively to the valley at the upper course of the Ak-buru. Of the other two branches the northernmost or Turkistan chain forms the watershed between the basins of the Syr and Zarafshan, and does not belong to Karateghin; the other, the Hissar chain, divides the systems of the Zarafshan and Surkhab. This terminology, however, cannot be

adopted as final till the geology of these mountains has been studied and their inter-connection finally decided.

Near this mountain knot the Hissar, Turkistan, and Alai ranges apparently attain their culminating height. Many circumstances favour this presumption. All the passes in this part of the mountains are extremely difficult of access; some are almost impracticable for laden animals, and only remain open for two or three months in the year. Most of the glaciers, which are generally scarce in Central Asia, are to be found here, and the few persons who have been near this tangle of mountains have estimated the height of its surrounding peaks at not less than 18,000 feet. For instance, Baron Aminof judges the peaks near the head of the Zarafshan glacier to be over 18,000 feet. Fedchenko estimates those inclosing the amphitheatre of the Shurofski glacier at between 18,000 and 19,000 feet. The mass itself has hitherto been visited by no European.

Of the three ranges radiating from this centre, only two, as we have already seen, viz. the Hissar and Alai, and these only as regards their southern slopes, are comprised in Karateghin. The former touches it on the east from its commencement as far as the sources of the Sorbokh. Throughout this extent its crest is apparently above the snow-line, which on the north side has an elevation of 12,000 feet, while some, if not all the passes, are above the limit of perpetual snow. The eastern part of the Hissar range was mapped during Abramoff's expedition to the head-waters of the Zarafshan, in 1870.* Since then it has not been visited. M. Oshanin could not see the chief range from the Surkhab side for intervening heights. At a few of the higher stations between Mujuharf and Garm snowy peaks were visible, but it was impossible to say for certain whether they belonged to the chief axis of the range or were situated on its offshoots.

From the Karateghin side this range is crossed by five passes. The westernmost of these leads to the sources of the Yagnaub, and is only available for pedestrians. Three—the Pakshif, Vadif, and Piobrut—lead from the sources of the Sorbokh to the Upper Zarafshan, and lastly the Yarkitch conducts thither from the right, westernmost, head tributary of the Obi-kabud. Only one of these cols, the Pakshif, has been instrumentally measured, and found to be 12,000 feet. This and the Yarkitch are available for pack-animals, the remaining three can be crossed only by foot passengers. They are all difficult of access and only open in the summer months, though frequently used by the inhabitants of the Upper Zarafshan, who bring their bread supply from Karateghin by these routes, especially over the Pakshif Pass. The eastern part of the Alai range bordering on Karateghin is even less

* See R.G.S. Journal, vol. xli. pp. 338–342—a short notice of this important expedition. The detailed narratives by Mishenkof, Aminof, Grebionkin, &c., have never appeared in English.

known than Hissar. No European has ever set foot in it, for the mountains explored by Fedchenko at the sources of the Isfara apparently belong to the Turkistan and not to the Alai range, and are situated west of the mountain knot. There appear to be only two very difficult passes across it, the Tarak and Ala-udin. The first leads from the left, eastern, head-stream of the Obi-kabud to the sources of the Sokh, the second from the upper waters of the Obi-zanku to the Ferghana village of Okhna, situate between Shah-i-mardan and Vadil. Fedchenko, in the description of his journey in the Khanat of Kokand, gave the first and very full information of these passes, to which the following particulars have been added by M. Oshanin regarding the Tarak Col. The road over the Tarak Pass certainly crosses a glacier as M. Fedchenko correctly surmised, but his informants appear to have designedly magnified its dangers. They told him that the Col itself could only be reached by pedestrians, and that those who went that way were obliged to fasten sticks to their bodies to support them in case of their falling into a fissure.

M. Oshanin, however, learned that the Tarak was practicable even for laden horses, provided that the weight of the pack did not exceed 100 lbs. But this means of communication only lasted for a month—from the middle of July to the middle of August. On the 28th August, when M. Oshanin made his inquiries, the Tarak was, according to the Karateghinians, hardly passable, and its state generally that year (1878) was extremely bad, owing to the unusual severity of the preceding winter. It was reported that the glacier was much fissured and rendered unsafe by large masses of snow which had remained unthawed, and completely concealed the crevasses.

The length of the road over the glacier was said to be half a tash, or 2½ miles, but distances cannot be estimated with accuracy over such rough ground, where one mile seems to be more like five on the level. However this may be, the Tarak is decidedly one of the very difficult passes, practicable, though not without risk, and chiefly serviceable for pedestrians; indeed, horsemen will not attempt it, unless compelled by their necessity to come this way, preferring a more circuitous route into Ferghana by one of the more easterly passes.

With reference to Ala-udin nothing is yet known, except that it is also among the very difficult passes. In proof of this, M. Oshanin relates that some Kara-Kirghiz messengers he sent from Karateghin, where they were nomadising at the mouth of the Obi-zanku, to Marghilan, preferred making the circuit viâ Kara-kazyk, a by no means easy pass.

Kara-kazyk was visited by M. Oshanin in 1876.* He found it very

* He accompanied the force under Prince Wittgenstein to the Pamir, see R.G.S. Journal, vol. xlvii. pp. 44 *seqq.*, for a translation of Kostenko's account of this reconnaissance. The heights are wrongly given, thus on p. 45, 12,600 feet are assigned to the Col, whilst in the appended list at the end of the article the figures stand at 14,400 feet.

bad, owing to its great height (14,400 feet), steepness (particularly on the Ferghana side), and the loose stony nature of the ground, which gave no secure foothold for the horses. Nevertheless, and in spite of the lateness of the season (17/29th September), the expedition to which he was then attached in the capacity of naturalist, traversed it safely. They were fortunate, however, in having fine weather, which thawed all the snow, for at these great heights it is impossible to rely upon the weather, and the traveller caught in a storm on the Kara-kazyk would fare badly, and his position might become critical.

Since the Kara-kazyk Pass, then, is so full of difficulties, and yet was preferred by M. Oshanin's native messengers to the more direct Ala-udin Col, the last-mentioned is probably almost impracticable. Moreover, according to hearsay information collected by Fedchenko, Ala-udin is not a regular route, but rather a track used by robbers, though it is quite possible that the chief difficulties are not at the Col itself, but in the approaches to it along narrow defiles.

South of the Alai and Hissar ranges in a direction parallel with them, not far from the right bank of the Surkhab lies a secondary ridge. This apparently begins on the east at the lofty Shum-kara peak, which is said to surpass in elevation all the other summits of the Alai range. From it flows the Kichik-Karamuk-su, a rivulet only 10 miles long, explored by M. Oshanin in 1876. From the point he then reached the crest of Shum-kara was invisible, being concealed by the nearest heights. Judging, however, from its vicinity to the Surkhab, Shum-kara is probably situate south of the main axis of the Alai range.

Of this, additional proof is afforded by an examination of the road from the head-waters of the Zanku to the Kara-kazyk Pass. The Kirghiz sent to Marghilan by M. Oshanin at first ascended the Obi-zanku, and from its head-waters crossed directly to those of the Kok-su by way of Kichik-Karamuk and Katta-Karamuk-su. Hence it may be inferred that the sources of the Obi-zanku and Kok-su (Kara-kazyk) lie close together, and are only separated by a spur of the mountains, which probably links Shum-kara with the Alai range. From this explanation of the topography it appears that four rivers take their rise in Shum-kara, viz. from its southern slopes the Kichik-Karamuk and Katta-Karamuk-su; from the north-west the right affluent of the Obi-zanku, and from the north-east the left tributaries of the Kok-su.

East of Shum-kara is an offshoot which divides the basins of the Kok-su and Katta-Karamuk-su; on the other side of it, not far from Katta-Karamuk, is Gurundi Pass, 10,000 feet above sea-level.

To the west of Shum-kara, as already stated, extends a ridge with a direction from E.N.E. to W.S.W. along the whole of Karateghin. Its last spurs terminate west of the meridian of Faizabad, and it margins the valley of the Surkhab on the north. But in its western extremity this chain no longer borders the Surkhab itself, but its right tributary,

the Obi-garm-daria, as well as the Iliak, forming the watershed between this river and the Kafirnahan, whilst it preserves its original direction throughout. Three affluents of the Surkhab—the Obi-zanku, Obi-kabud, and Sorbokh—pierce this range. Its crest is at various distances from the Surkhab, in some places not more than four miles, then again much further, leaving an interval filled in with high spurs across which there are passes. The ridge itself is very well seen from Garm, from the mouth of the Obi-dashta-siab and from Muchun Pass. It is very serrated, and here and there speckled with perpetual snow, particularly at the sources of the Obi-dashta-siab and Muju-harf. M. Oshanin judged the height of some of its peaks to be at least 14,000 feet. On the west the range is lower, and there its loftiest summit, Hazret-isha, on the border of Karateghin, is only from 12,000 to 13,000 feet above sea-level. There are doubtless several passes across it, but M. Oshanin only heard the name of one, the Soz, leading from the Obi-yasman, a right tributary of the Obi-kabud, to the basin of the Sorbokh. M. Oshanin only obtained a clear perception of this range after the survey had been drawn and numerous intersections made by his travelling companion, M. Rodionoff, an officer of the Topographical Corps, who has done much work in Central Asia. The cause of this was that, during the journey, the range was mostly concealed by its offshoots and valleys, rendering it impossible to obtain a general view. Besides, its severance in three places made the matter more obscure. The same type of mountains prevails in Karateghin as in Ferghana at the sources of the Zarafshan, that is to say that parallel with the main range are other chains pierced by rivers, and it is just in these narrow chasms formed in this way that the road is so extremely bad. The name proposed by M. Oshanin for the whole of this range from Shum-kara to its western extremity near the mouth of the Iliak is "Karateghin."

Great as are the Alai and Hissar ranges, in elevation they are surpassed by that chain which lies along the left bank of the Surkhab, and was named by M. Oshanin in honour of the first Russian sovereign who took in hand the exploration of Central Asia, "Peter the Great." Unmasked by outlying mountains, this range rises as a lofty wall, stretching from the mouth of the Muk-su along the whole southern border of Karateghin. Its connection, however, with the mountains rising from the left bank of the Muk-su opposite Altin-mazar is not apparent. It begins, probably, at some peaks near Tupchek, a favourite summer pasturage of the nomads, due south of the mouth of the Muk-su. From this point the range extends along the left bank of the Surkhab with a general direction E.N.E. and W.S.W. West of the meridian of Obi-garm it is pierced by the Surkhab, then crossing to the right bank of this river it forms the southern watershed of the affluents of the Obi-garm and Iliak rivers, and stretches away to Faizabad. The Surkhab bursts through it with a very narrow gorge, apparently most difficult of access,

for at its entrance the mountains appear to meet over the river. But the usual approach to Karateghin is by the Faizabad and Obi-garm road, not by the Surkhab. Farther east, Peter the Great range is again pierced by the Khullias, a tributary of the Surkhab. Its westerly part is bare of snow, but in the meridian of Garm patches of it make their appearance, and farther east the range rises to an enormous height. Directly opposite the Karateghin hamlet of Nimichi-bolo and about seven miles south of it the triple-headed Sari-Kandal peak rears up to a height estimated at 18,000 feet, its central head throwing up two sharp pinnacles. Even from Garm, Sari-Kandal is the most conspicuous object in view, and from Nimichi-bolo its grandeur is remarkably impressive. Between this place and Garm, from a deep glen in Peter the Great range, a glimpse is obtained of a still higher group of peaks south of Sari-Kandal, but whether in the range itself or in a subsidiary chain lying on the left bank of the Khullias it is impossible to say.

To the east of Sari-Kandal, Peter the Great range rises above the limit of perpetual snow. Here stands the isolated peak of Saganaki, 10 miles from Sari-Kandal and about the same distance due south of Kalai-Khait, whence it appears to have the same elevation as Sari-Kandal when viewed from Nimichi-bolo, but the distance being somewhat greater than in the case of the last-mentioned, it is probably very little of it at all below 20,000 feet. East of Saganaki the range is almost entirely masked by its outlying mountains and can only be seen from two or three deep glens. This part has apparently a lower altitude, snow only lying in patches, and it cannot, therefore, exceed from 14,000 to 15,000 feet. Beyond this depression and to the east of it the elevation is again enormous at Tupchek, where a group of four peaks rise. They are distinctly visible from Zanku, but from Jailgan their appearance is very striking, for they stand forth prominently from this point of view, the nearest, easternmost, of them being only 15 miles off, and its height may therefore be taken at 25,000 feet, while the others cannot be less than 22,000.*

The two easternmost only have a direction parallel with the axis of the range, those on the west are farther south and appear as if they belonged to some other chain. No. 1 appears to be the starting-point of Peter the Great range and of another chain, dividing the basin of the Khullias from that of the Wanj-ab; this ridge M. Oshanin proposes to name "Darwaz."

There can be no doubt that from peak No. 1, Peter the Great range extends in a westerly direction without a break beyond the borders of Karateghin. It may, of course, turn out that the ridge of mountains which margin the left bank of the Muk-su from its sources to peak No. 1 are also

* In order to distinguish these four peaks it will be found convenient to number them 1, 2, 3, and 4, beginning with the highest, easternmost, and ending with the westernmost.

a continuation of the same great range. M. Oshanin saw them only in two places, at the head-waters of the Muk-su and opposite its mouth. From the last-mentioned station he could see, but indistinctly owing to the clouds, great numbers of snowy crests in a south-easterly direction. At all events, in the present state of our knowledge and while there remains some uncertainty as to the orography of this part, it will be more prudent to limit Peter the Great range, and not extend it farther east, leaving to future explorers the task of deciding any doubtful points.

East of the Khullias, Peter the Great range is crossed by three passes open only in summer, for in winter the only means of communication between Karateghin and the valley of the Khullias is along the bank of this river. The westernmost is the easiest of these cols and may be crossed by pack animals. The Kamchirak, for that is the correct name of the pass, is erroneously named on all maps Shah Kend, or Shah Kendu, the word Shakandachi, properly speaking, only applying to the descent. Kamchirak faces the Karateghin hamlet of Saripul, and is approached over soft ground by a gradual ascent. On its summit there is a level expanse about half a mile wide. The distance from Garm to the summit is reckoned to be two tash or 10 miles. The descent of Shakandachi is steep and stony; for some distance it lies along the crest of a ridge with precipices on either side, but since 1878, when the Bokharians improved the road, it may be considered safe. This pass leads to the Darwaz fort of Childara, on the right bank of the Khullias.

The second pass, also available for pack trains, lies between peaks Sari-Kandal and Saganaki. To the west of the latter and close beside it a saddle may be observed in the range, here lies the snowy and difficult Liuli-harvi Pass. Three miles of snow have, it is said, to be traversed on this route. The southern slope is much fissured, suggesting the possibility of a glacier lying below. By this way the Darwaz village of Ishtian is reached.

Lastly, the third, and apparently the most difficult of the three, is opposite the mouth of the Zanku, and is called Gardani-Kaftar.

Besides the four ranges we have described there is yet a fifth in Karateghin, but this only touches it on the east. We refer to the Trans-Alai. The Karateghin portion of it does not present that continuous mass of perpetual snow which characterises the range east of the Ters-agar Pass. Here in Karateghin it is cut by numerous gorges and appears to be structurally compact. Snow lies only on some of the peaks; yet in spite of its comparatively low elevation the range is apparently impassable; at all events, the Kirghiz could not mention a single col between the Ters-agar and the mouth of the Muk-su. It is quite possible that there may be means of crossing it, but that for want of an object these have never been explored. The wintering places on the lower Muk-su are easily reached from Jailgan by the valley of the river and near Altin-mazar lies the track over the Ters-agar, one of the

easiest cols even for camels. Moreover, the valleys of the Muk-su and Surkhab, between Kichik-Karamuk and Jailgan are very thinly inhabited, owing to the want of good wintering places in that direction. The summer pasturages are on the head-waters of the Kichik-Karamuk-su, Obi-zanku, and at Tupchek.

All the ranges, together with their offshoots, form a large number of longitudinal and transverse valleys, the longest of these being that which intervenes between Peter the Great and Karateghin ranges, and which is mostly occupied by the course of the Surkhab, including in its westernmost end the Obi-garm flowing east to the Surkhab, and the Iliak running west to unite with the Kafirnahan.

The watershed between these two rivers is imperceptible, the valley of Dashti-bidan (quails' plain), where they rise, being a high steppe, such as are common in the highlands of Central Asia. For it may be established as a rule that every wide level valley has the characteristics of a steppe, in the total absence of trees and bushes, even on the slopes of the margining mountains; it is only in deep secluded glens that arboreal vegetation appears, in the steppe-like forms of plants which grow there, *Farulaceæ*, feathered grass (*Stipa*), hairy-grass (*Lasiagrostis splendens*), and various kinds of wormwood. These upland plateaux afford admirable summer pasturage for the nomads. Dashti-bidan is at this season occupied by encampments of Uzbeks of Hissar of the Kalluk tribe; on this steppe are the sources of the Iliak and Obi-garm-daria. Ascending one of the head-streams of the first of these rivers M. Oshanin found that after proceeding along the bank some distance the track left the water's edge, approaching it again after a while. No perceptible difference having been noticed in the level he thought he was following the same river, and was surprised on observing later the water flowing in an opposite direction, proving that he had crossed the watershed between the basins of the Kafirnahan and Surkhab, here undivided by the smallest eminence.

As we have said, the larger, eastern part of the longitudinal valley is occupied by the course of the Surkhab, the northerly branch of the Amu-daria, known under three names. Its upper stream is the Kizil-su of the Kara-Kirghiz; in Karateghin itself, among Tadjiks, it bears the name of Surkhab, and in its lower course it is called the Vakhsh. The sources of the Surkhab in the Alai are largely fed by the melting snows of the Trans-Alai range. The red clay so widely distributed in that range mingles with its water and lends to it a ruddy tinge, which has earned two of its names, Surkhab and Kizil-su, i. e. red water. But the name is not appropriate when applied to lower parts of the river, for after receiving the dirty grey water of the Muk-su it assumes a brown colour.

The Upper Surkhab Valley is called Dasht-i-Alai (Alai Plain), or simply Alai, and extends to a low hill which is the water-parting

between the Kashgarian Kizil-su (tributary of the Kashgar-daria) and the Surkhab.* Over this low ridge or hillock lies the road to the Tau-murrun Pass.† M. Oshanin is of opinion that the lower limit of the Alai should be fixed at the west end of Katta-Karamuk. Here the river enters a gorge, and completely alters its character. East of Katta-Karamuk the valley is throughout wide, and only below Daraut-kurgan spurs of the mountains press upon the right bank, while there is enough level space on the left side between the river and the mountains. West of Karamuk the gorge continues without a break to the mouth of the Muk-su. Here the Surkhab flows in a single channel, and the road is mostly high above the water, only descending now and again at the estuaries of small streams, where there are level spaces of no great extent. Near the mouth of the Muk-su the valley widens on the left bank of the Surkhab and is somewhat uneven; through it the river has eroded a deep bed. Farther west the valley presents a succession of trough-shaped extensions, united by gorges formed by spurs hemming in the river. To avoid these narrow places the road leaves the river and follows a side ravine, then crossing the spur rejoins the Surkhab. Below Katta-Karamuk the following passes across lateral spurs occur:—Jalghiz-archa, before reaching Kichik-Karamuk wintering place; Sarigui and Kashka-Shirak, between Kichik-Karamuk and Atchik-Alma; Mainak and Jul-terek, before coming to the valley of Obi-zanku; Turpi and Obi-yasman, near Nimichi-bolo; Muguk, leading to the lower Mujuharf. Of these the only important one is Turpi, which is 2500 feet above Nimichi-bolo. But the road does not always circumvent these gorges, occasionally it goes right through them, along ledges of rock ascending and descending, here and there artificially supported from the side by wooden props, to which the Russians in Turkistan have given the name of *balkonchiki*, i. e. little balconies. These are piles driven into the side of the mountain, supporting beams upon which are thrown brushwood, earth, and stones, so as to form artificial cornices.

In the wider parts the river frequently divides into several arms, but nevertheless it is nowhere and at no season of the year fordable. All the trough-like extensions have been apparently at some time lakes. At all events, traces of raised beaches forming terraces are everywhere apparent. These are first seen outside Karateghin at Katta-Karamuk, where they are particularly well developed. They are invariably three in number. The uppermost and oldest having been more subject to aqueous action is less well preserved than the others, and is usually indicated by clumps torn from and clinging to the hill-sides. The soil of these terraces is almost wholly alluvial, a mixture of sand, shingle,

* In order to avoid confusion, as there are so many rivers of the name of Kizil-su, it has been thought advisable to use the Tadjik name Surkhab in speaking of this river.

† Not Ton-murrun, as erroneously given on some maps. Ton-murrun is nonsense. Tau-murrun is the mountain's nose.

and clay, and therefore is rarely cultivated, for the large quantity of pebbles prevents the plough from penetrating. Their horizontal plane, especially of the uppermost, is slightly inclined, not more than 2° or 3°, towards the river; their sides fall abruptly at an angle of 45°. Between the lowest terrace and the river there is a level expanse, also covered with alluvial deposits. In these widenings of the valley the Surkhab invariably flows by several arms, and the soil is a loose, easily eroded alluvium; this circumstance, combined with the rapidity of the current, accounts for the continual changes taking place in the direction, depth, as well as the number of channels into which the river divides. The trough-like valley widenings, with their raised beaches, occur most frequently between the mouths of the Obi-zanku and Obi-garm-daria, where the villages of Pillon, Garm, Pomboi, and Ali-galiabon are situate.

As already stated, the Surkhab in Karateghin is unfordable. The last ford is on the border, near Katta-Karamuk, in Russian territory; but even here it is only after the end of August, i. e. when the summer floods have subsided, that the river can be safely crossed. Hence three bridges have been thrown across the Surkhab in Karateghin; two above the mouth of the Muk-su at Duvana and Dumbratchi, the third below Garm, near the hamlet of Saripul. They are all constructed after one model in the following fashion: rough piers of alternate rows of timbers and stones are raised on either bank, so as gradually to incline over the river, the higher the more they overhang the water and diminish the span; timbers are then laid across to support the roadway, which is made of boughs, earth, and stones. These bridges are very unsafe, and shake even when crossed on foot; to ride over them requires the steadiest of nerves and some experience. There are no carts in Karateghin, and the bridges are therefore only wide enough to admit of single horsemen. Handrails are dispensed with in these primitive constructions.

Bridges being so few in number, communications between the several hamlets on either bank are with difficulty maintained, and in order to avoid long circuits it is customary to swim the river. In parts where the channel is subdivided, this may be done on horseback, elsewhere recourse must be had to skins: these are the entire skins of goats, sheep, or cows filled with air, and sufficiently buoyant to support a man on the surface. Several swimmers are in the habit of roping themselves together when about to cross, and the most experienced takes the lead. These crossings are not devoid of danger, especially where the banks are precipitous and the current very rapid, and deaths by drowning occur every year in the Surkhab.

Within the borders of Karateghin the Surkhab receives several important tributaries, besides a large number of minor feeders. The following join it on the right: Kichik-Karamuk-su, Obi-zanku, Obi-kabud, Sorbokh, Obi-dashta-siab, Obi-muju-harf, and Obi-garm-daria.

These all rise in the Karateghin range, except the Obi-zanku, Obi-kabud, and Sorbokh, which burst through it in narrow gorges, difficult of access. They are the only channels by which the melting snows on the Alai and Hissar ranges reach the Surkhab; they are therefore more copious than all the others, especially the Sorbokh.

The Obi-zanku is known to the Kirghiz under the frequently recurring name of Kok-su, and is formed of two rivers—the Lai-su, flowing from the left, and the Tamdi-kul, which may be regarded as the parent stream, whereas the Lai-su is merely a tributary. The Tamdi-kul rises in the Alai range at the Tarak Pass. The Lai-su has its source apparently in the offshoots of the principal range near the pass of Tiulvoye-davan. Its water, judging from the name (Lai-su, i. e. dirty water), must be very thick, and it is highly probable that this river is fed by glaciers, which give it a muddy appearance, the more so as the colour of the Obi-zanku is a greenish white, precisely similar to that of the combined Kaindi and Suak-su, the latter of which flows from glaciers. Towards its mouth the Obi-zanku divides into several channels in a wide, pebbly bed margined on two sides by well-defined terraces, and is fordable. M. Oshanin and his party forded it two miles above its mouth, and the water barely reached the horse's belly, but the current was rapid, although the river had fallen. At high water this must be a difficult and dangerous crossing.

The Obi-kabud is somewhat greater than the last-mentioned river. Its sources are in the Alai and Hissar ranges. Its upper waters are incorrectly named on all existing maps Dahi-milia-adal,* a corrupted form of a hamlet whose proper name is Dehi-mullah-badal, i. e. village of the Mullah Badal (probably an early settler). The names of inhabited places are, it is well known, often applied to rivers flowing near them.

At the sources of the Obi-kabud, as already stated, there are two passes: one, the Tarak, to the village of Sokh, in Ferghana; the other, Yarkitch, to the Zarafshan. The roads to these cols apparently bifurcate

* Some Central Asian names become strangely distorted on maps. Thus Yakobak frequently takes the place of Yakka-bago (single garden), Kafirnahan appears instead of Kafirnihan (hidden infidel), Karatchkum and Karatchkhum take the place of Karatchki-kum (robbers' sands), &c.

These mistakes are unavoidable. Sarts and Kirghiz pronounce so indistinctly, swallowing some of the syllables, that without a good interpreter (and these are scarce) even after the words have been repeated several times, one may fail to catch the sounds. There is yet another cause for these mistakes. In many parts of the country now occupied by people of the Turk race, Persian names of places have been preserved; the people not understanding the meaning of the words, of course distort them. Analogous instances are everywhere to be met with in Russia, where German names, e.g. Schlüsselburg, Oranienbaum, and Ranenberg, have been vulgarised into Schliushin, Ranbof, Ambur. To instance one more name in Central Asia, the river and town Sang-girdak signifying "surrounded by stones," has been altered in several ways, and appears on the map in the corrupted form Sangri-dagh.

at the village of Dehi-mullah-badal, reckoned to be four tash or 20 miles from Kalai-Khait. The defile by which the Obi-kabud bursts through the Karateghin range is said to be very narrow, and hardly practicable. It has numerous cornices. Opposite Khait, and but two miles above its mouth, the Obi-kabud divides into several arms, and may be forded, though not without difficulty, owing to the depth and velocity of the current. Above Khait there used to be a bridge, but it was carried away during the unusually high floods in 1878. In its lower course the Obi-kabud flows across a longitudinal valley of the Karateghin range. The two sections of this valley formed in this way are watered by two tributaries of the Kabud meeting here. The eastern portion is not above five miles long, and is occupied by the Obi-Khait, at whose mouth is a village of the same name. At the head of the valley is a small lake Khanzi-Khait (Khait pond), having no visible outlet. Between the lake and the source of the Obi-Khait an eminence may be remarked from the foot of which this river flows, fed by the water of the lake which filters through a crack in the rocks.

The western section of the valley is much the greater, measuring 12 miles in length, and from two to three in width. It is watered by the Obi-yasman, and is one of the most populous and fertile tracts in Karateghin; west of the Obi-yasman lies the Soz Pass, leading to the Sorbokh, whilst southwards a road over the Turpi Col debouches on the Surkhab.

The Sorbokh takes the first place among the eight tributaries of the Surkhab. It bursts through the Karateghin range by the defile of Darai-Kamaran, a name applied on many maps to the whole river. The head-waters of the Sorbokh apparently drain a wide tract of the southern slopes of the Hissar range. From them, as already mentioned, three passes cross to the upper Zarafshan—the Piobrut, Vadif, and Pakshif. Near its mouth the river flows in a wide transverse valley with well-defined terraciform beaches; at the hamlet of Podjeh it is bridged, and at its mouth the river divides into several arms, and is fordable at low water, but even so late as 20th August (1st September), when M. Oshanin saw it, the water was too high to be safe.

Of the left affluents of the Surkhab we shall only dwell on the Muk-su and Khullias. None of the others deserve to be called rivers; they are merely streamlets, for the crest of Peter the Great range closely aligns the Surkhab. Let us begin with the Muk-su, and describe the orography of its upper basin, though it does not belong to Karateghin, but forms part of Ferghana. This locality was visited previously to M. Oshanin's expedition by L. F. Kostenko in 1876 and J. F. Mushketof in 1877. But neither of them went beyond Altin-mazar, and therefore much additional information has been gained by M. Oshanin.

Altin-mazar lies at the southern foot of the Ters-agar Pass, situated in a much lower part of the Trans-Alai range, 9842 feet in height.

The ascent of the pass is very gradual from the side of Alai; it con-

tinues the whole way by the Tuz-su, a left affluent of the Surkhab. The transverse defile occupied by the course of the Tuz-su bears the name of Tuz-dara and Altin-dara.* It is 50 miles long, and has a fall in that distance of 1800 feet, so that the road is very good, and easily travelled even with camels. The descent from the Ters-agar Pass, on the other hand, is very short and steep, but perfectly safe. The height of Altin-mazar has been estimated at the same as, or a little over, that of Daraut-kurgan. Altin-mazar is the name of the tomb of a Mussulman saint, Hodja Fazilmanda, a descendant of the Khalif Omar. It is situate at Kuta-Kushta, which comprises a *tugai* or flat overgrown with trees and bushes, and a few fields with a nearly wholly abandoned Kirghiz wintering place.

Three rivers unite at Altin-mazar, viz. the Suak-su, Kaindi, and Sel-su, to form the Muk-su, which flows by several channels in a pebbly valley about 1¼ mile wide. On the south it is confined by a lofty ridge which rises directly from the valley, without any intermediate heights, considerably above the snow-line. Directly opposite Altin-mazar three peaks rise from this range, viz. Shilbeli, Sandal, and Muz-jilga. The first and easternmost fills the angle formed by the union of the valleys of the Sel-su and Muk-su; Muz-jilga is the westernmost of the three. Beyond, the range is invisible either from Altin-mazar or Ters-agar Pass, being hidden by the summits of the Trans-Alai Mountains. Sandal is the highest of the three peaks (23,950 feet) though the others are not much below it. The snow-line appears to be below the half of their height. However this may be, these are among the highest mountains of Central Asia. The view of them from Altin-mazar and Ters-agar Pass is superb. Nothing intervenes between the observer and their summits, and owing to their being so near they appear to shoot up to the sky. M. Oshanin had seen nothing in the Alps, the Caucasus, or Central Asia to equal the wonderful effect produced by their rugged grandeur.

Two small glaciers descend from the slopes of Sandal, each of them probably less than a mile long and 230 yards wide at their lower ends. They terminate before reaching the valley, and appear to be either wholly inaccessible or at all events very difficult to approach. Their lateral and terminal moraines are distinctly visible, medial they have none, for they receive no tributaries. These glaciers were described by Kostenko, and were inserted on maps, but a third also represented as descending from the mountains near the mouth of the Kaindi does not apparently exist.

Of the three rivers forming the Muk-su, the Sel-su flowing north-west contributes the greatest volume of water. Its valley is similar to that of the Muk-su, the bed being composed of pebbles and sand and the river divided into several channels. On the left it is hemmed-in by

* Altinin-dara according to Fedchenko. Tuz-arasi in Mushketof's narrative.

the slopes of Mount Shilbeli, and on the right by lower hills. Both descend very steeply, and in places almost precipitously, to the valley, which is 1¼ mile wide. This is its character for a distance of 12 miles, when it is closed by a glacier from beneath which the Sel-su issues at several places. The glacier which has given its name to the river (Sel in Kara-Kirghiz dialect signifies glacier) is formed of two principal arms uniting at its end. The first and largest of the two occupies the upper extension of the Sel-su valley, and therefore lies north and south. It is closed on the east and west by lofty snowy peaks seen from below to extend for 10 miles. After that they open out and their continuations are invisible; on the south no peak appears to bound the head of the glacier. There is therefore an absence of data for an estimate of its length, but in any case it cannot be less than 13 miles long. Hence it is a glacier of the first rank. M. Oshanin's expedition named it "Fedchenko" in honour of the traveller.

At the lower end Fedchenko glacier is joined by another which occupies the Taminas defile. This latter is much shorter and has a general east and west direction. The whole width of the lower end of the glacier is 1¼ mile. The terminal moraine is only visible in places, in other parts a vertical ice-wall 210 feet high is presented to view, and scattered about its foot are huge lumps of ice. The end of the glacier is irregular, bulging outwards. It partly enters the valley of the Baland-Kiyik, opening on the east into the valley of the Sel-su. The glacier nearly closes the mouth of the Baland-Kiyik valley, leaving only a narrow entrance 280 feet wide. According to old inhabitants of Altin-mazar, there are years when the glacier entirely closes the exit of the Baland-Kiyik valley, obliging the river to form a lake above the icy barrier. The water then continues to rise till it bursts through the ice, producing in this way serious floods in the valleys of the Sel and Muk-su. An inundation of this kind is recorded to have taken place about ten years ago, when many of the fertile tracts were entirely swept away. At present the glacier is again apparently advancing. M. Oshanin and his party were there on the 12/24th September when the passage of the Baland-Kiyik was 420 feet wide, and the ice formed an arch at this spot. Three days later they found the arch broken, and the passage narrowed by blocks of ice to 280 feet. That part of the glacier towards the valley of Baland-Kiyik presents a terminal moraine, and there the glacier may be ascended, but where it finishes with precipitous sides it cannot be approached without danger owing to constantly falling stones. Unprovided with either guides or regular mountaineering outfit M. Oshanin did not venture to go further, the more so as he had not the necessary experience for such work, but he climbed on to the glacier and saw its medial moraine. A rising wind and the threatening aspect of the sky also conduced to turn M. Oshanin back after passing two hours on the glacier. The slopes of the surrounding mountains at

its end descend very steeply, and it is quite impossible to climb them, M. Oshanin could therefore obtain no distant view of the surface of the glacier or count its medial moraines. At Altin-mazar, however, he met an old sportsman who in his youth had frequently visited the glacier on hunting excursions after ibex, and according to his report the glacier is 20 miles long. From it there is a pass to Darwaz, known as Kashal-ayak, or the long-legged. It debouches in the valley of the Vandj; only the most experienced mountaineers venture this way, and for several summers not a soul has traversed it. The glacier being within the Russian frontier, and easily reached from Alai, it is to be hoped that some one will undertake its exploration at no distant future. It should be added that the lower end of the glacier is about 9000 feet.

The Baland-Kiyik which, as already stated, joins the Sel-su on the right, has no glacier at its source and its water is therefore transparent and green. It flows in a valley extending from east to west. Three passes lead from its head-waters; the Kokui-bel debouching on Kara-kul, the Kaindi on the river of that name, and the Takhta-korum on Poliz, and thence to the Murghab, i. e. into Shighnan (Shugnan). M. Oshanin followed the last mentioned, but after proceeding 10 miles along the Baland-Kiyik was obliged to turn back for the path proved quite impracticable for laden horses. The Kirghiz usually avoid this *mauvais pas* by first ascending the Kaindi from Altin-mazar, and then crossing the pass of this name into the valley of the Baland-Kiyik where it presents no special difficulties. But this route was not available for M. Oshanin as the Kaindi *col*, at all times covered with perpetual snow, was unusually blocked owing to the heavy snowfall of the preceding exceptionally severe winter. While they were there a Kirghiz arrived who related how he got his horse across by placing felt under its feet and thus kept it above the snow. With their large number of pack animals however M. Oshanin and his party could not attempt such a mode of proceeding. His personal survey therefore of the head-waters of the Muk-su was limited to the course of the Sel-su and the lower part of the Baland-Kiyik valley. Of the other two rivers which form the Muk-su he only saw the mouths. Both the Suak-su and Kaindi flow through defiles from east to west, at their sources rise lofty mountains covered with perpetual snow which are visible from Ters-agar. The Suak-su issues from a glacier; this was evident from the colour of its water and was confirmed by hearsay reports. The river is auriferous, and the Kirghiz have for a long time obtained gold alluvium, but in small quantities. It flows in a very narrow defile,* while the road up the Kaindi is reported to be without any great difficulties.

As above stated, the confluence of these three rivers, the Suak-su, Kaindi, and Sel-su, form the Muk-su. This river from Altin-mazar to

* M. Oshanin heard of a road from the sources of the Suak-su, leading across the Trans-Alai range to Aral-kungoh at the northern end of Tuz-dara defile.

its estuary is only known from report. Centres of population, i. e. wintering places of Kirghiz, are only met with at its mouth, not far from which is a bridge at Liaksh, a wintering resort. The greater part of the Muk-su is said to be very narrow, the road is carried along cornices, and is impracticable for laden horses. Even pedestrians cannot pass it in winter, on account of the snow which fills the defile. According to the Kara-Kirghiz, at one day's march from Altin-mazar there is a waterfall on the Muk-su, six spears' lengths, or from 35 to 40 feet high. Other Kirghiz denied its existence. The estuary of the Muk-su is near Dumbratchi. Here the river flows in several channels, with a rapid stream and with dirty brown water.

Another left affluent of the Surkhab is the Khullias, which in its upper course from its source to Tabi-dara bears the name of Vakhia. The expedition only saw the mouth of this river. Its valley is separated from that of the Surkhab by Peter the Great range, and from that of the Vandj-ab by still loftier mountains. As already stated, the Khullias near its mouth bursts through Peter the Great range, and only that part of its course below the gorge belongs to Karateghin. Its valley is wholly comprised in Darwaz, and therefore will be considered later on in the description of the last-named country.

Karateghin is inhabited by two races, the western part by Tadjiks, the eastern by Kara-Kirghiz, only in its westernmost corner, on the head-waters of the Obi-garm-daria, are the summer pasturages of the Uzbek tribe of Kalluk, who in winter remove to Hissar. The Tadjik territory appears to be gradually extending upwards and infringing upon the Kirghiz camping grounds on the east. Forty years ago the whole Surkhab valley above the Obi-kabud was said to have belonged to Kara-Kirghiz. At the present time the tract between the mouths of the Obi-kabud and Obi-zanku is occupied by Tadjiks, and it is only above the last-named river that encampments of Kara-Kirghiz are continuous.

The Tadjiks, as all over Central Asia, lead a sedentary life. Their villages are numerous, but not large. Many of the hamlets number no more than five houses; Garm, the capital of Karateghin, has only 300 houses. Of towns proper there are none, not even a trading centre or a bazaar. Forts are constructed at Garm, Muju-harf, Obi-garm, Namdonak, and Kalai-liabi-ob. Most of the hamlets are on the central Surkhab, between the estuaries of the Sorbokh and Garm; still denser is the population in the valley of the Obi-yasman. The tributary valleys of the Surkhab are it appears, from hearsay information, thinly populated.

Agriculture is the chief occupation of the Tadjiks. They produce enough corn in Karateghin to supply the Upper Zarafshan and Darwaz. The fields are of two kinds: those which depend on the rainfall for their water supply, and those artificially irrigated. The latter are compara-

tively insignificant, because they require level surfaces on which to admit the water. The soil of the shore beaches, as already remarked, does not usually admit of culture, owing to its nature and the immense quantity of pebbles, which prevent the plough from penetrating. Irrigated land is therefore only seen in small plots, with the exception of the valley of the Obi-yasman, which is irrigated throughout. On the flooded lands are sown common millet (*Panicum miliaceum*), Italian millet (*Setaria italica*), lucerne, flax, tobacco, melons, water-melons, vegetables, such as carrots, onions, beetroot, turnips, and cabbage, in small quantities, besides maize and cotton occasionally. Cotton is very little cultivated, and M. Oshanin only saw two small patches of it near Garm. It is liable to perish, owing to early frosts, without yielding any return.

Near the hamlets all the hill-sides which have any soil at all, and are not too steep, are cultivated. These depend on the rainfall for their supply of moisture. Some of them are at a great height above the valley, and often on such steep gradients as to be approached only with difficulty. Nevertheless the Karateghinians contrive to till them with a plough yoked to a pair of bullocks. They bring their corn home in sledges, a practice common in other mountainous districts of Turkistan, and in the Caucasus, Suanetia being an instance in point. The sledges are short, light, and furnished with a pole, to which they fasten a pair of bullocks in the usual way. The non-irrigated land is for the most part sown with wheat and afterwards with barley. The seed-time is always in spring, never in autumn.

The hamlets are surrounded with gardens, which are of great use to the inhabitants. The most common of the fruit-trees is the mulberry of both kinds, white and black; the fruit dried either in the sun or in ovens is an article of food, and is known as *tut talkan*. It keeps well, and forms an agreeable relish in winter when eaten with bread. Besides mulberry, peaches, apricots, grapes, plums, cherries, apples, pears, quinces, and walnuts are cultivated. Only two kinds of fruit-trees grown in Turkistan are not raised in the Karateghin valleys, viz. figs and pomegranates. All the above-mentioned fruit-trees are cultivated at Kalai-khait, and apricots thrive as high as Zanku. The wild apple is met with at Atchik-alma, not far below Kichik-Karamuk. Besides the cultivated sorts, the people of Karateghin also make use of wild fruits. These are plentiful, especially in Lower Karateghin, below the mouth of the Sorbokh, a kind of plum, yellow and red, about the size of a cherry, being particularly frequent. The Turki name for this is *tag-alincha*, or "mountain cherry." The other wild fruits are nut, apple, haws, barberry, and pistachio (very rare).

Cattle breeding is with the Tadjiks of secondary importance; and what strikes one as strange is the almost total absence of asses, so common among Tadjiks in other parts of Turkistan, in the valley of the Zarafshan for instance, in the district of Khodjend, and in Ferghana.

Oxen are exclusively used for field work. They possess a very peculiar kind of goat, small with very long coarse hair nearly reaching to the ground. They spin the wool of their goats and sheep, and make cloth or stockings of it; their cloth gaiters are a characteristic feature of their costume, and that of the inhabitants of the upper Zarafshan Valley.

Though supplying their wants for the most part with home produce, the Karateghinians are not wholly independent of imports. These are cotton and iron. Cotton and the materials into which it is made are brought by itinerant merchants from Ferghana; iron comes from Darwaz. The trade is exclusively one of barter, for money is very scarce, though Bokharian and Kokandian *tengas* of the value of 20 copecks * each are current. The chief exports are corn and furs (marten and fox). Corn is sold by measure. The unit is the *batman*, equal to 15 bowls or 45 *tiubetékas* † filled to the rim. The inconvenience of this standard, which must vary in every case according to the size of the seller's head, must be very great, notwithstanding which it is in universal use in Karateghin. In the summer of 1878 a batman of wheat was worth 10 tengas, i. e. 2 roubles (4*s*.), at Garm; but in the winter of 1877–8 it rose to double that price.

Very many Tadjiks of Karateghin hire themselves out for service mostly as *saraimanni*, i. e. labourers about a caravanserai, in which capacity they are met with in all the larger towns of Russian Turkistan and Bokhara. This is in fact their exclusive monopoly, a class of occupation for which their tried honesty and great strength well fits them. They have almost driven all rivals out of this branch of industry. Their attachment to their country is another very marked feature of the Karateghinian character; a man who has put by a little money invariably returns home, laying out the wages he has earned in the purchase of cotton yarn which has always a ready sale in Karateghin.

Eastern Karateghin is inhabited by Kara-Kirghiz of the Kara-tait Tupchak, and Hidirsha tribes. Their winter quarters are in the valley of the Surkhab and on the lower Obi-Zanku, Kichik-Karamuk-su, and Muk-su; their summer pasturages as far as the snow-line on the southern skirts of the Alai and the northern slopes of Peter the Great ranges. Here they lead their usual semi-nomadic life engaged in cattle breeding but also growing a good deal of corn round their winter habitations. Some of them sow as much as twenty batmans and obtain on an average a yield of sixfold. Their system is one of sharing half and half. The rich man supplies his poor neighbour with seed and lends him oxen to plough his land and get in his harvest. He never remains near the cultivated fields for his wealth consists chiefly in cattle, and this obliges

* At the present exchange (1883) a copeck is worth about a farthing of our money. 20 copecks would be therefore 5*d*.

† The skull-caps generally worn by all Mahommedans in Central Asia from Russia to China.

him to seek the higher belts. The grass near the winter quarters is reserved for winter use; to obtain it the beasts must scrape away the snow as they invariably do in all parts of the Kirghiz steppes. Hill-sides swept by the violent winds are best suited for this purpose. Little snow and much wind is the Kirghiz idea of a favourable winter. Neither man nor beast mind the severity of the frost provided the snow is not too thick and the winds strong enough to blow it away; otherwise the animals perish from starvation. One such disastrous season happened in 1877–8, and was felt keenly by the nomads in Karateghin and the Alai. M. Oshanin heard many complaints of that inclement winter and convinced himself they were not exaggerated. It was the same all over Central Asia. Even on the lowlands snow remained a long while unmelted, and in Tashkend sledge-driving lasted a month, with the thermometer as low as − 22° R. (− 17° Fahr.); the mountains were of course thickly covered, and parts of the valleys to a depth of 14 feet. Then followed severe frosts without wind, instead of the usual violent gales common on the highlands. The cattle sought in vain for food and began to lose strength, their owners tried to stave off the evil time by feeding them on grain reserved for their own use, hay they never store for winter; at last the corn was all gone and starvation stared them in the face. The few who had money bought flour and millet in the Tadjik settlements. But the horses had by this time mostly succumbed; the survivors were so weak from want of food as to be hardly able to move, and the Kirghiz whose habit was to ride no matter how short the journey he had to make, was obliged to set out on foot and walk forty or fifty miles to fetch a sack of flour, weighing about a cwt., and return with it on his back. In the Tadjik settlements corn was dear, the harvest of the preceding year having been a failure, and the reserves had been eaten by the cattle. Prices rose enormously and 20 copecks (5*d.*) were paid for a *tiubetéka* of millet. The Kirghiz herds, particularly the sheep, died off in large numbers. Individuals who had owned 2000 head were left with fifty in spring, and horses became so scarce that when M. Oshanin visited the country the year after this terrible season a bowl of *kumiss* (mare's milk) was considered a rarity. The camels fared better, and here let us remark that the Karateghin and Alai Kara-Kirghiz are the only people who keep, besides the two-humped camel (*Cam. bactrianus*) the *koshmak*, a cross between the Bactrian species and the one-humped camel. The one-humped camel (*Camelus dromedarius*) is never bred in this highland country. Neither are yaks (*Poephagus grunniens*) domesticated in Karateghin, though met with on the Alai above Katta-Karamuk, and M. Oshanin saw a herd of these animals at Mamai, five miles to the east of Daraut.

In conclusion, a few remarks on the roads. Those in Karateghin, as in all other mountainous districts, are mere tracks, wide enough for pack animals to pass in single file. The chief road lies along the right bank of

the Surkhab, and is open throughout the year, though communications are occasionally interrupted for days together by violent storms. Some of the villages lying in lateral defiles are inaccessible in winter, and their inhabitants remain cut off from the rest of the world. The route taken by Oshanin is not particularly difficult, though steep ascents and descents are frequent, and among its other incidents are hanging cornices, bridges with a lively vibratory movement, &c. The section between the mouth of the Obi-garm-daria and Ali-galiabon is perhaps the worst, for here there are two very sudden ascents, and the track lies along ledges of nearly precipitous rocks a great height above the river; no actual dangers, however, have to be encountered, since it was repaired for the passage of the Bokharian troops, when 500 to 1000 men were reported to have worked at it for ten days. Formerly accidents of a fatal kind were not uncommon. The chief obstacles to communications are the bad fords across the Obi-kabud and Obi-zanku, which in June and July, after a snowy winter, are not altogether safe. The road along the opposite left bank of the Surkhab, judging from hearsay information and the general topography, must be much worse than the one described. Peter the Great range is close to the river, and numerous torrents descend from its snowy summits to join the Surkhab, cutting deep ravines in its steep sides, and afford serious obstacles to the construction of a road.

From the foregoing it should not however be inferred that Karateghin may serve as a convenient route for a strong military force, or even for a large caravan. The difficulty in obtaining forage in sufficient quantity would be great, and grass is not always met with, particularly in Central Karateghin, between the mouths of the Sorbokh and Obi-kabud. Lucerne is sown in sufficient quantities only to supply the wants of the people, and barley mixed with wheat is also sparingly cultivated. Hence, although the nearest road from the Hissar Valley to Kashgar passes through Karateghin, it will hardly be available for large parties if the trade between these places were ever to become of importance, an event, however, not at present to be anticipated. In such case the circuitous route viâ Samarkand, Jizak, Khodjend, Osh, and Terek-davan, will be found superior to the direct Karateghin road. But for small parties of twenty to thirty men with thirty to forty pack animals, the last-named is much preferable and comparatively good.

### 3. Darwaz.*

Darwaz was till recently an independent state, ruled by its own Shah, who acknowledged fealty to the Ameer of Bokhara merely by sending annual presents, and these were always reciprocated by the

* M. Oshanin was not himself in Darwaz. The only person to visit it in recent times was Dr. Regel, a translation of whose letters will be found in the 'Proceedings' for July 1882 (vol. iv. No. 7), with a sketch map of the country.

Ameer. In all internal affairs the Shah acted independently. The last Prince of Darwaz was Seradj-eddin-Khan, a relative of Mahommed-sayid, Shah of Karateghin. When the last-named prince was taken prisoner in 1877, and Karateghin finally united with Bokhara, Seradj-eddin proclaimed his independence, and discontinued his customary *tartuk* or presents. Thereupon the Bokharian troops, commanded by Hudai-nazar-datkha, the new bek of Karateghin, invaded Darwaz in December 1877. The war was apparently not attended by much loss of life, but it lasted till the spring of 1878, the deep snows and severe frosts of that season having caused its duration. Only one serious engagement was reported to have taken place near Kala-Khumb, where the defenders lost 200 of their men, while the Bokharians, according to their own account, had only three men killed. At all events Darwaz was completely defeated. The Shah was taken prisoner, and sent a captive to Bokhara, where he is still under surveillance. Most of his family, including his heir, Mahommed-Afzal-Khan, escaped to the south-east into Shughnan, and thence made their way to Ferghana, where they are now residing. In this way Darwaz became part of the dominions of Muzafar, Ameer of Bokhara, and Hudai-nazar-datkha was appointed bek. The people of Darwaz, however, were not so easily pacified. At all events in 1878, 5000 Bokharian troops, chiefly taken from Hissar and Karateghin, almost denuding them of their garrisons, were stationed in the conquered country.

Darwaz is the mountainous region occupying the valley of the Pandj from Shugnan to Kulab, and the valleys of two large rivers, the Vandj and the Khullias.* Its population appears to be much scattered, and consists chiefly of Tadjiks, a few nomad Kara-Kirghiz being met with on the Upper Khullias. Comparatively little land is cultivated in the valley of this river; corn is seldom sown, but the crop is chiefly cotton, which they barter in Karateghin for wheat. Their diet is supplemented by the fruit of the mulberry preserved for winter use, and cattle are fed upon its leaves. They keep no silkworms. Besides cotton, their exports are gold and iron. The iron ore is obtained near Fort Vandj, where it is said a whole hill is composed of it.

Darwaz is a most inaccessible country. The only road by which it can be entered by pack trains is that from Garm to Kala-Khumb, and along the valley of the Khullias. The other roads are mere footpaths, only to be travelled by those accustomed to them. Even in Karateghin they spoke of them as "such places as only the people of Darwaz can pass, we cannot." Yet the Karateghinians are by no means contemptible mountaineers. The difficulties chiefly consist in the narrow cañons

* Dr. Regel applies the name "Khullias" to designate a locality, not the river itself. On his sketch map, the names "Vakhia-balk" and "Vaksh" appear for the upper and lower course of this river. As the Surkhab, however, is also known as the Vaksh, it would be convenient and probably correct to retain the name "Khullias."

flanked by lofty precipitous cliffs with a torrent rushing along at their foot. Here there is no ledge or "cornice" to give a footing, recourse must be had to a break-neck arrangement, though the roads are not quite so bad as they are sometimes represented. It was told to M. Oshanin that travellers in Darwaz were swung along in baskets suspended from the face of the cliff, the manner of progress being thus. The traveller got into the first basket, swung himself till he caught hold of the second, entered it, and continued the manœuvre till he had reached the last basket. This seemed on the face of it impossible, for how could baskets be hung from the cliff so far apart as to be beyond arm's length? The explanation, however, was simple, and threw an entirely different light on these marvellous contrivances. They were merely a variety of the so-called "balconies" to which allusion has already been made. Instead of being constructed in the ordinary manner, the horizontal timbers let into the rock (usually light) were connected by trestle-work, and their outer ends fastened with ropes to projecting rocks and trees. Some of these balconies are long, and oscillate under the feet of the passer-by. This, then, is the explanation of the story of swinging baskets.

Some of them are boarded over, but in any case they will only bear the weight of a man, and owing to their being seldom repaired, accidents to travellers are not unfrequent. Darwaz has no towns, not even a bazaar or market-place, but merely a few forts, the chief of which are Kala-Khumb, Kala-Vandj, Childara, and Tábi-dara.

Kala-Khumb stands on the right bank of the Pandj, and was always considered the capital of Darwaz and the seat of its Shah. Now, since the union of Darwaz with Bokhara, it has become the administrative centre and the residence of the bek. Its citadel has the reputation of great strength, and is larger and better than Garm. It stands at the confluence of the Pandj and Khumbou, where the former of these rivers flows in a single channel, and may be crossed in autumn and winter in boats. Kala-Khumb means "fortress of the pitcher," a name said to be derived from a rock having the form of a pitcher near the source of the Khumbou. This rock, after which the river is also named, was destroyed by Bokharian soldiers during the late war.

From Kala-Khumb roads lead both up and down the Pandj, equally bad in either direction. The first upper road follows the right bank to Djumardj at the mouth of the Vandj. Djumardj is a fort demolished by the Bokharians. Ten miles farther the valley of the Pandj becomes very narrow, and is known under the name of Yaz-ghulan. Here lies the way into Shugnan, only practicable for foot passengers, though about 100 houses are scattered along it.

From Djumardj another track leads up the Vandj to the fort of this name, five miles up the river. Above Vandj there are but few inhabitants. As already stated, from the sources of the Vandj to the Muk-su there is a pass, Kashal-ayak, if a mere opening in rocks can be called a

pass, for it seems that ordinary mortals will not attempt it: none but experienced mountaineers venture that way. Another pass, Sargi, leads from the Vandj to the valley of the Khullias, and there are probably communications from the Vandj to the Lower Murghab or Aksu valley in Northern Shughnan or Roshan. None of his informants, however, could tell M. Oshanin anything about it. Most of the evidence obtainable related to the road from Karateghin to Darwaz, which shall now be described.

In proceeding from Garm to Kala-Khumb it is necessary to keep along the right bank of the Surkhab to the hamlet of Saripul, where the river is crossed by a bridge. On the other side the road bifurcates, the two branches reuniting at Fort Childara in Darwaz. One of these tracks leads over the Kamchirak Pass, which has already been described.* This is the best of the two routes, and is reckoned to be half a day's journey, or about 20 miles, the summit of the pass being about half way. From the pass the Shak-ob rivulet is followed to Childara, situated on the right bank of the Khullias, near the mouth of the Shak-ob. The traveller who has crossed Peter the Great range by the Kamchirak Pass will find forests all the way to Childara, but he can only come this way in summer, in winter another route has to be taken.

The second winter road leads from Saripul down the left bank of the Surkhab to the mouth of the Khullias, and passes to the other side of Peter the Great range by the gorge of this river. Here there is a very narrow place, which may however be avoided by making a circuit and crossing the low Yafitch Pass, which takes its name from the Karateghin hamlet on its summit. After leaving the gorge the traveller finds himself in Darwaz, which includes the remainder of the valley of the Khullias. This river is only fordable in autumn and winter: it has therefore been bridged below Childara, near the hamlet of Pashal. The whole distance by the route we have just given, from Garm to Childara, is about miles, divisible as follows:—

| | |
|---|---|
| Garm to Saripul .. .. .. .. .. .. .. | 4 miles. |
| To Mouth of the Khullias .. .. .. .. .. | 20 " |
| " Yafitch .. .. .. .. .. .. .. .. .. | 5½ " |
| " Childara .. .. .. .. .. .. .. .. .. | 10½ " |
| | 40 miles. |

At Childara the summer and [illegible] feet. From [illegible]
road follows the right ba[illegible] s through [illegible]
and inhabited valley [illegible] on the left [illegible]
miles from Childara. [illegible] oss the Khullias
[illegible]veller going to S[illegible] r, and [illegible]
[illegible]e in summer [illegible]
[illegible]e defile of

above Tabi-dara, and which is preferred only in winter when the other track becomes impassable. Zakh-bursi has about the same elevation as Kamchirak: its ascent is steep and stony, but the descent is easier. From Tabi-dara to Sagri-dasht the distances are, by the summer road 15 miles, by the winter 18.

Having left Sagri-dasht behind him, the traveller has another range —the Darwaz—to cross, and here he will pass from the basin of the Surkhab to that of the Pandj, a transition which is effected by traversing the Hobu-rabat Pass, somewhat lower, but steeper and more stony than the last. On its southern slope, astride of the Khumbou river, are the two hamlets of Hobu and Rabat facing each other. These hamlets are 16 miles from Sagri-dasht and the same distance from Kala-Khumb. The last part of the road along the valley of the Khumbou is by far the worst. Here the traveller has to make his way as he best can along narrow ledges, first on one side of the river, then on the other, crossing and recrossing by 15 bridges. Along wider parts of the defile there are a few scattered hamlets.

The shortest summer route from Garm to Kala-Khumb has therefore a length of 78 miles, divided in the following sections :—

| | |
|---|---|
| Garm to summit of Kamchirak Pass .. .. .. | 10 miles. |
| To Childara .. .. .. .. .. .. .. .. | 9½ „ |
| „ Tabi-dara .. .. .. .. .. .. .. .. | 16 „ |
| „ Sagri-dasht .. .. .. .. .. .. .. .. | 10½ „ |
| „ Hobu hamlet .. .. .. .. .. .. .. | 16 „ |
| „ Kala-Khumb .. .. .. .. .. .. .. | 16 „ |
| | 78 miles. |

These distances are of course merely approximate. The unit everywhere in Central Asia is the tash, a quantity varying in the different localities, but generally considered to be equal to 12,000 paces, eight versts, or rather over five miles. No attempt has been made to calculate distances in Darwaz with anything approaching to accuracy, for here, as in the more civilised parts of Central Asia, the length of road is roughly estimated by the time it takes to travel it. It is obvious, therefore, a wide margin should be allowed for possible errors.

A few words in conclusion on the valley of the Khullias above Tabi-dara, where this river is known as the Vakhia-balk. The valley continues the same as before, i.e. is well peopled and cultivated. Three tash or 16 miles beyond Tabi-dara is Fort Ishtiun on the Vakhia. Hence there is a direct road into Karateghin by Kalai-liabi-ob and Kalai-khait, crossing the Liuli-harvi Pass. From Ishtiun to Kalai-khait is reckoned to be half a day's march. There are settlements in the Khullias (Vakhia) valley for some distance above Ishtiun, and it is only in quite the highest parts, whence Karateghin may be reached by the Gardani-Kaftar Pass, that encampments of Kara-Kirghiz are met with. This long Khullias

valley, then, is bounded on the north by Peter the Great range, while on the south rises a still higher chain, which M. Oshanin has named the Darwaz range.

### 4. The Zarafshan Glacier.

#### *M. Mushketof's Exploration.**

M. Mushketof's narrative of his ascent of the Zarafshan glacier appeared in the *Isvestiya*, 1881, No. 2, but has not been translated.† The month of August (1880) was chosen because the rivers are then at their lowest, and the snow line at its maximum height. Fine weather may then be generally depended upon, an important consideration in such an enterprise, which necessitates walking for ten days over ice and snow, the estimated distance being 33 miles. Meteorological observations were undertaken by M. Ivanof, and a topographer of the name of Petrof kept the route survey and took sketches of the scenery. The party were further provided with a dragoman or interpreter by General Ivanof, commanding the Zarafshan district, and an escort of seventeen Cossacks, with two native guides or jigits. By August the necessary instruments and implements were ready, and on the 6th the expedition started—a caravan of forty horses—from Ura-tiube.

They first went south, crossing the Turkistan range by the Aúchi Pass, the summit of which they found to be 11,800 feet above sea-level. From this point they could see the Hissar range, which even at that distance appeared much higher than the one they were on, and was covered by greater masses of snow and ice. The Upper Zarafshan or Matcha valley appeared as a chasm or rift between the ranges, and seemed incapable of sheltering a whole tribe of people. Oburdan was reached at 9 P.M. the following night, the effect of moonlight on the weird outlines of the mountains being very remarkable. The Upper Zarafshan is one of those characteristic longitudinal valleys, the sides of which are composed of uniform clays and schists, sandstone and hornblende, the bed of the river being filled with alluvium of sand, loess, and conglomerate. As far as the village of Postigau chalk is met with. Wherever the schistose strata are synclinal, the valley is somewhat wider and the sedimentary deposits more marked. It is in these spots that the natives have erected their miserable dwelling-places, harmonising in their wretchedness with the stern aspect of the mountains. It took five days to travel about 100 miles from Oburdan to the glacier, such are the difficulties of the path which often overhangs the frothy waters of the Matcha.

The valley of the Zarafshan, says M. Mushketof, with those of its affluents, especially the Anzob and Yagnaub, has for a long while served

* This section of Mr. Morgan's Memoir was read as a paper at the Evening Meeting, March 12th, 1883.

† A brief notice of it appears in the 'Proceedings,' vol. ii. p. 765.

as a place of refuge for all the discontented spirits in the neighbouring khanats. It was the resort of such characters who laid the foundations of those independent communities which are now included in the highland districts. But isolated as were these mountain communes, the wild and barren nature of the country could not satisfy their daily wants, and this as well as perhaps other causes compelled them to hold intercourse with the lowlanders, and brought them into connection with the blood-stained annals of Bokharian history. They often suffered from the tyranny of some Khan, and occasionally threw off the hateful yoke. Their own form of government, however, was not distinguished for its humanity, and the sanguinary administration of their kazis is to this day remembered with horror by the inhabitants. It was only with the advent of the Russians that they knew a more tranquil existence. In fact, the history of the highland *tiumens* is anything but attractive, although one cannot help admiring the staunchness displayed by the people in preserving to the present time their old customs and habits. The inhabitants of the Upper Zarafshan are typical Tadjiks known under the general name of *Galcha*. They have led so secluded a life that to this day they speak their old language, and are so proud of it as to consider it unnecessary to associate with the Uzbegs, and have held aloof from their kinsmen for ten centuries, a phenomenon only to be explained by the influence of mountains in preserving the original character of their inhabitants. Like the neighbouring Uzbegs, too, the Tadjiks have occupied every available plot of ground, turned every slope of the valley to account, only to keep starvation from their doors, and wrest with extraordinary labour a bare sufficiency from ungenerous nature.

A comparison of the settlements of the lowlanders with those of the highland districts brings forward a very striking feature. All the towns and villages of the neighbouring plains of Turkistan are built of loess or clay, and stand on clay. Throughout the East, from China to Turkistan, this greyish-yellow, sandy, siliceous clay takes a prominent part in the well-being of the natives; this, the "black earth" of the East, is as important as water: no wonder the Sarts should say "where there are *turpak* and *su*—clay and water—there will you find the Sart." But ascending to the mountains the quantity of clay diminishes, conglomerate takes its place, and with this change the settlements are less numerous and the people poorer. Absolute elevation has, of course, something to do with this, but clay is the principal factor. Oburdan, the first of the highland settlements, as far as climate is concerned, is admirably situated, but in culture is far inferior to the villages lower down the valley. There is still, however, enough clay here to make huts; there are gardens, and small plantations of poplars whose pyramidal shapes accord well with the pointed peaks of the mountains. Above Oburdan, ascending towards the glacier, vegetation and fields

become scarcer, and at Paldorak there is no longer a single garden or plantation seen; instead of clay the houses are all of stone; low, four-cornered buildings of boulders, put together often without cement, hovels rather than houses; irregular groups of them without streets, merely connected by paths, constitute the village. These huts are often placed so near cliffs that it is only on close inspection they can be distinguished from the surrounding masses of rock.

At Vadif and Dihauz vegetation is still scantier; there are no trees, only a few stunted bushes of juniper and willow. The cultivated ground is only recognisable by the green blades of grass springing up between the stones, though carefully fenced round with the same boulders and irrigated. Yet these cultivated patches, often situated on fearfully steep and lofty slopes, difficult of access, and affording a precarious foothold when reached, are all the natives have to depend upon for subsistence. They contrive to till them, ploughing their land and harvesting their crops. Of domestic animals they have but few; donkeys, sheep, and an occasional cow are all they possess; there are no horses or camels; indeed, there is nothing for them to eat. Even dogs are very scarce, and the ten required by Mushketof's party to take with them up the glacier were with difficulty procured, thanks to the exertions of Akimbétief. Fowls too were hard to find, but this was exceptional, and was due to an indiscriminate slaughter of poultry that year, preached by a hadji from Mecca who said that fowls would be the ruin of the Tadjiks; therefore they sought to secure themselves from danger, and not only the people of Matcha, but Kokandians, Syr Darians, and others.

The natives of Matcha perform all their journeys on foot, and only use donkeys as beasts of burden. When Mushketof appeared with his caravan of forty horses, doubts were expressed as to the possibility of feeding so many, "and it must be confessed," says M. Mushketof, "we ate up half their year's supplies, our silver kokans being much preferred to their stores." All the natives are excellent pedestrians, as will be readily understood. At Oburdan Mushketof came across a remarkable one, Abdu Samat by name, who in a day and a quarter walked 66 miles, over difficult mountain paths with fearfully steep ascents and descents. But his exploits appeared nothing remarkable when compared with those of the inhabitants of Paldorak, Vadif, Sabak, and other villages. An old man, a native of Sabak, crossed the difficult Yanghi-Sabak Pass in one day. Akimbétief said that the Matcha people traversed the Rama glacier, a distance of 32 miles, in fifteen hours. Grave but good-natured faces, with shaven Mussulman heads and black, bushy beards, broad shoulders, high chests, and thin wiry legs, these are the characteristics of the Matchinians. "Their joyless lives, their stone villages, all remind us," says M. Mushketof, "of prehistoric man of the stone age; just as sandy clay takes the first place in man's life in the lowlands, so here at

the glacier do stones, boulders, and shingle. Of stone is his house, on stone his land, stone are his implements, handiwork, and defences. In the course of all my travels in Central Asia this was the first time I saw undressed stone put to so general, so rude, and in its way so original a use. The nearer the glacier, the more striking the peculiarities of this distant relative of the men of the stone age, living among almost bare rocks and within sight of the glacier."

Thirty miles before reaching the glacier, the first ancient terminal moraine was met, closing the valley as with a wide rampart; from it three rows of lateral moraines led upward, much disturbed by the action of water, nevertheless preserving their form. Enormous masses of granite, syenite gabbro, and other of the higher formations, had been carried hither long ago and deposited on slopes of schist. Many of the boulders are 30 to 40 feet in diameter and 500 tons weight. These unmistakable moraines afford positive proof that the Zarafshan glacier formerly descended much lower and was at least 30 miles longer than at present. The erratic blocks extend uninterruptedly to the glacier, where they are connected with recent terminal moraines. Misled by this connection and the partial destruction by water action of the ancient moraines near the glacier where the three large streams, the Yarkitch, Rama, and Zarafshan unite, the Iskander-kul Expedition fell into the grave error of denying the existence of these moraines, though any careful observer would find too many proofs to be overlooked of their continuance for upwards of 30 miles; for instance, they are particularly conspicuous near Diaminor, Paldorak, at every step near Langlif, Vadif, Dihissar, Dihauz, and other places, so that M. Mushketof was at a loss to explain the extraordinary mistake of his predecessors.

The old moraines, however, far away from the present end of the glacier, differ but little in elevation above the sea level from those in course of formation. Thus the lower end of the glacier is 9000 feet high, Paldorak is only 8000 feet, but the boulder drift occurring on slopes 700 to 800 feet above the bed of the valley, the maximum difference in height is not much over 200 feet.

About four miles before the glacier is reached, the valley widens a little, and at the same time is enlivened by small bushes and patches of grass. From this point the aspect of the glacier is peculiar. In the midst of lofty steep slopes with sharp schistose peaks lies a yellowish-grey mass, filling the whole valley, putting an end to the boisterous torrent of the Zarafshan, and looking very unlike ice. The impression produced by it is novel, but the nearer the glacier the more imposing its appearance. After crossing the enormous moraines of a lateral glacier descending from the Hissar range and called Navishur, the ends of several others are at once seen. Near them M. Mushketof halted to prepare for the ascent. On the left was the great Rama glacier, on the right the Yarkitch, and straight in front the wide, principal Zarafshan

glacier, the goal of their wanderings. It was a marvellous sight; from every side, from deep gloomy ravines advanced the quiet masses of ice bearing enormous moraines and finally discharging streams almost black in colour, bearing away boulders and lumps of clear ice. The stern, lifeless region of ice contrasted wonderfully with the bushes of willow and juniper in the midst of which they were encamped. The first thing noticed on approaching the principal glacier was the vast accumulation of the terminal moraine through which the Zarafshan has cut a channel. Its banks, one-third of a mile higher, terminate in an ice arch underneath which the river rushes forth. The rapid melting combined with the erosive action of the stream causes frequent falls of the arch with its superincumbent masses of stone, breaking from time to time the pervading silence. The ice sections exposed by these falls show admirably the irregular stratification of the ice, depending on the greater or less pressure to which it has been subjected. The Yarkitch glacier still joins the principal one, but the Rama glacier is disunited, both having receded, though the moraines clearly show that they have not long been separated. The Rama glacier is frequently traversed by natives on their way to Ferghana by the sources of the Isfara and the Shurofski glacier.

All unnecessary impedimenta were left behind on arriving at the foot of the glacier, and nothing but the indispensable taken, for from this point the caravan had to be sent back, and the ascent commenced on foot. All this would have been soon arranged had not the porters protested. It seemed to M. Mushketof surprising that such excellent, untiring pedestrians as these natives, should have on no account consented to accompany them merely because the Zarafshan glacier was difficult to walk over, that none of them had ever crossed it or knew the road. Their fears arose chiefly from some fable of stone pillars at the summit, an extensive snow-field where it was easy to lose one's way, and lastly, Kara-Kirghiz on the other side who would infallibly kill them. Presents however, in the shape of boots, halats, *chekmeni*, and fur coats soon produced the desired effect, and a plentiful meal of mutton quite pacified them. But though they agreed to go with M. Mushketof, they refused to carry the things, i. e. do that for which they were engaged. Akimbétief wasted much eloquence and cunning before he could persuade them into believing that the loads were mostly rusks, i. e. food for themselves, and that besides rusks and presents they would receive daily payment. From this place M. Mushketof despatched his first telegram to Tashkend, to the Ethnographical and Anthropological Society, and did this every day he was on the glacier.

At last, having come to an agreement with the porters, twenty of whom were taken, and selected five Cossacks and the two jigits, they started on the 13th August, a party of thirty men armed with long pikes and laden with packs to ascend the glacier. They proceeded by

its left side along a moraine which filled the space between the side of the glacier and the contiguous slope. This commencement was difficult enough, and the men halted very frequently, out of breath with the weight of their packs, the heat, and the exertion of springing from stone to stone over enormous pointed blocks of granite. The first day M. Mushketof and his friends exchanged their European boots for native leather stockings without heels, which gave greater security and ease to the feet. After about a mile they could measure the thickness of the ice, finding it to be 250 feet, or exactly the same as its thickness at the vault over the Zarafshan. The slopes still exhibited occasional green patches of grass, but the surface of the glacier was a complete waste of rocks. Not a trace of ice or snow could be seen; the whole was covered with a drift proceeding from the medial moraine formed by the union with the Zarafshan of its tributary instreams. Heaps of stones were piled in rows of cones more or less regular in form. These combined with its dreary aspect, the high temperature (25° Celsius), and the monotony of the scenery, produced an impression similar to that of the Kizil-kum, the only difference being that instead of sand dunes there were hillocks of stone. It was difficult for the travellers to realise that they were marching over a glacier, particularly as the first day they ran short of water. Farther on it was obtained in hollows between distinct cones, but this was almost too impure to use. Besides the difficult ascent, the first day was full of troubles; the goats and dogs had to be trained to work, the loads equally distributed, &c. All this occasioned some amusement, particularly when the Matchinians began boxing the goats' ears as a punishment. By sunset that evening the expedition had only advanced three miles, when finding a pool of cleaner water they halted for the night opposite the large lateral glacier of Farakhnau and its *vis-à-vis* Porak, uniting almost at right angles with the principal glacier. Though their position under the open sky on sharp-pointed shingle was not an enviable one, the more so as a cool wind began to blow after sunset and the thermometer fell below zero, their supply of wood enabled them to make fire sufficient to warm themselves and cook their food, which pacified the Matchinians, who had begun demanding their day's pay, and frankly announced their intention of deserting at night. Of course their demands were refused, but a few kokans and a supper off goat's flesh restored good relations with them.

The next day progress was more satisfactory, the moraines were less numerous and composed of different rocks. The granites were now nearer the right or the Turkistan side,* whilst on the left or Hissar side schistose drift was brought down in large quantities by two new glaciers, Nazar-ailak. It was much easier walking over the schistose moraines where there were none of the large boulders and more of the pebbles, and progress was proportionately more rapid the second day,

* That is to say to the right of the glacier, but to M. Mushketof's left.

when six miles were accomplished, a result partly due to the greater tractability of the dogs and goats, partly owing to fatigue and partly hunger, particularly the goats, for the dogs had still bones to gnaw. And the second day the excellent qualities of the porters began to show themselves, especially their elder the Akhund, whose instinct in picking his way between fissures, deep, wide, and difficult to distinguish amidst the conical heaps of stones, was extraordinary.

The second day also level patches of snow began to make their appearance, with small crevasses, especially on the left side where a huge glacier (named by M. Mushketof "the Akhund," in honour of the chief porter), falling abruptly from the Hissar range, joins the main stream. This day's march was also marked by the occurrence of several lateral glaciers, viz. Nazar-ailak, first and second, the enormous Akhund, and others smaller. The Akhund descends at an angle of 30° from a vast amphitheatre lying almost on the crest of the Hissar range between lofty peaks. Its surface is seamed by a tangle of fissures. Lower, the fissures are more regular, and at its junction with the chief glacier radiate from common centres; lower still the surface is covered with dirt-bands. All the glaciers of the Hissar range are remarkable for their abrupt fall, their network of fissures, their comparative shortness, and their small slaty débris, whereas on the right side the glaciers descending from the Turkistan range, such as Farakhnau, Tolstof, and Skatchkof (the two last were named after two Ural Cossacks who accompanied the expedition and were nearly lost) lie in deep ravines with steep sides, are long, gradual, and have granite moraines. These glaciers unite with those of the Isfara, are of older formation and have worn beds for themselves, whilst the Hissar glaciers are more recent and have only begun to scoop out their channels. In fact the lateral glaciers on the right and left are altogether distinct except in one feature common to all, viz. their direction lying nearly at right angles with that of the principal glacier; affording an explanation of the strong lateral pressure to which the great central mass is subjected, as evidenced by the appearance of the ice, the direction of the crevasses, and the confusion of the medial moraines. The temperature during daytime rose to 30° Celsius, and even to 40° Cels. at noon, but at night fell to — 4°–6° Cels., and this with a strong wind made their encampment on the ice opposite Tolstof glacier, at a height of 11,000 feet, disagreeable.

The third day was the most difficult and dangerous for them. They now walked over pure snow in the region of *névé*, met with several more lateral glaciers, Biely, Miramin, and so forth, and approached the amphitheatre and the pass beyond it across the Alai range, the whole of which was covered with a continuation of the same névé. Crevasses were frequent, but as there had been no fresh falls of snow they were open, and the treacherous ground could be seen and avoided; it was not even necessary to loose the dogs. The wide crevasses were circum-

vented, the narrower jumped with the help of the long pikes, which were now only appreciated by the people who took them so unwillingly at first. There are on the surface of the ice an immense number of narrow but deep cylindrical holes. At the bottom of these there is always a small quantity of mud from the glacier mixed with water; these are little glacier tumblers. Millions of streamlets course over the surface, uniting frequently to form rivulets with cascades. These form fissures quite distinct from the crevasses. Under nearly every stone were found heaps of small ugly insects, *Desoria glacialis*,* apparently the only living denizens of the dead region of ice and snow. The remarkable stillness was broken but at rare intervals by avalanches, which resounded in the mountains with a muffled roar. From the right lateral glacier of Miramin the slates and granites of the Turkistan range are replaced by medium grained gabbro, and of this are composed all the prominent peaks on the right side, reaching a height of 17,000 to 18,000 feet, as for instance Obrif (Precipice) Mountain. On the left side at Biely (White) glacier the granites stand forth, at first in small outcrops, but soon afterwards as the predominant rocks, composing all the peaks of the left side, and uniting at the pass with gabbro. They also rise in enormous sharply-pointed pinnacles, Igol (Needle) Mountain being conspicuous among them.

As the rocks change so does the glacier in some degree. Opposite the opening of the Miramin glacier it widens, instead of one mile it measures two, across; its surface is comparatively smooth and even; there are no wide crevasses, only numerous and beautiful glacier tables, and its direction becomes from this point more north-east; lastly, the results of its movement are more evident here than anywhere else. From Precipice Mountain to the pass itself, those characteristic *roches moutonnées*, glacial scorings, furrows, troughs, &c., are met with, all of them much better preserved on the granites and gabbro than on the friable schists.

Beyond the strait formed by Precipice Mountain on the one side and Biely on the other, there are hardly any moraines, and the glacier becomes a wide field of névé. Owing to its apparently boundless expanse on the east and south, the vast amphitheatre, the inexhaustible store-

* Also noticed by Fedchenko on the Shurofski glacier. He says, "In order to see the colour and structure of the ice, I raised a few stones scattered over its surface, and was astonished at the moving black mass under each stone; they proved to be small black glacier fleas, and I at once recognised them as such. I knew that these insects are met with in the glaciers of the Alps, and therefore was interested to find them in Central Asia, the species found by me having been subsequently ascertained to be identical with *Desoria glacialis* or *scandens* Ag. They were of every size underneath the stones, and it is therefore highly improbable that they come to the glacier from the surrounding mountains. Doubtless they are brought into existence on the glacier and pass their whole lives here. I found them at a height of 12,100 feet."—*Puteshestviye v. Turkestan*, tom. i., chart ii., p. 84.

house of the glacier, appears exceedingly grand; the névé covers both the Alai and Hissar ranges, and it is only on the north-west that it is fenced in by the vertical jagged ridges of gabbro which divide it from the glaciers of the Isfara. Looking upon the enormous supply of snow in this amphitheatre, the size of the Zarafshan is at once accounted for. This and the numerous tributary glaciers, the Porak, the Akhund, the Farakhnau, the Miramin, the Skatchkof, the Tolstof, and others, when considered in conjunction with the small width (one mile) of the chief trunk, explain the comparatively low level reached by the foot of the glacier and its descent far below the upper limit of vegetation. The numerous tributaries too produce frequent irregularities in the direction of the cracks, and are the immediate cause of the peculiar, desert-like aspect of the lower part of the main glacier, already commented upon. For upon closer inspection it appeared that each of the branches bore at least five rows of moraines in a channel not more than one-third of a mile across; so that reckoning the minimum number of rows and the chief branches only, upwards of thirty lines of moraines would be discharged into the main trunk, and would there become so confused and intermingled as not only to cover the whole surface of the ice, but pile up entire hills of débris.

M. Mushketof reached the névé at a height of about 13,000 feet; the pass was not far distant but the efforts necessary to reach it were great. The soft wet snow, and the exertion of leaping across crevasses at such a great elevation, retarded their progress and increased their difficulties. Their worst sufferings were occasioned by difficulty in breathing and pain in the knee-joints, producing a feeling which may be compared to that of having iron weights attached to the legs. Though the ascent to the pass was not steeper than 20° it appeared more like 50°, such were the conditions, and though repeatedly measured it was impossible to realise that it was only 20°. But when all difficulties had been overcome and they stood on the summit a marvellous picture was displayed before their eyes—a scene as grand as it was beautiful and diversified. In the foreground lay the boundless snowfield, glistening under a clear sky and southern sun with blinding brilliancy. In the sea of snow here and there rose jagged ridges, grandly towering peaks and bold cliffs, drawn with remarkable sharpness of outline on the white background. Far away on the west could be seen a labyrinth of mountains with fantastic crests, alternating with glittering belts of glaciers, and gradually dissolving in the distance, veiled in that transparent haze so characteristic of the whole of Central Asia.* The farthest peaks

* The phenomenon here alluded to is common both in the Tian Shan and Himalayas. It is produced by the wind blowing across the heated plains and raising great quantities of fine dust. Its effect on the tops of glaciers, says General Strachey, at an elevation of 10,000 or 11,000 feet is to obscure the view, though not quite so bad as a London fog. Kostenko observed the same phenomenon in Kokand and on the Pamir.—See R.G.S. Proceedings, O.S., vol. xxi. pp. 131, 139.

appeared suspended baseless in the air. From the huge upper snow-field the main Zarafshan glacier unrolled itself by degrees, harsh-featured and lifeless, yet majestic in its tranquillity. It was like a massive trunk spreading out its branches on either side; on the right, long and deep in gloomy defiles; on the left, steep, dazzling, and uneven, like frozen waterfalls.

But this does not exhaust the picture. On the east from the valley of the Zardalya rose a similar panorama of mountains even grander and more diversified; rays of glaciers descended abruptly into the dark abyss of the Zardalya defile, their surface scarred by huge ice-falls.

Up to this time the ascent, though full of difficulties, had not been so dangerous as the descent into the Zardalya afterwards proved. The glacier on the other side is no longer a wide level field, but falls in steep ledges. The first, about 150 feet high, is still within the névé region and terminates in a snowy expanse; here the descent was by a rapid glissade. The second, nearly 300 feet, is of frozen snow and ice, and abuts on a fearful ice-fall, seamed with deep, gaping fissures; to keep one's footing on a slippery incline of 40° or 50°, or to slide down it, were alike impossible without falling into a crevasse. Only one course was open—to fasten an anchor, attach ropes to it and holding by these to cut steps. This was done, but the work was tedious; day ended, cold had begun, all were wearied, more crevasses lay before them. After several hours' exertion, however, they succeeded in descending and lowering the loads, but not without accidents, though happily not of a dangerous kind. Two Cossacks only, Skatchkof and Tolstof, slipped on the incline, and would have infallibly perished had they not by some lucky chance stopped their headlong flight on the very brink of the crevasse, escaping with bruises and contusions. The third ledge was comparatively easy, but after it was passed there was another ice-fall and endless fissures to be crossed. Darkness had set in; to proceed farther or encamp was equally impossible; it was difficult even to find a level space a few yards square; there was no time for consideration, and they decided to lie down where night had overtaken them, especially as the topographer had fallen ill and could go no further. As misfortune would have it, the worn out Matchinians raised a protest. Naturally they were dissatisfied with the prospect of passing a night on bare ice with 4° of frost. Throwing down their burdens they departed, and though next to certain that they could not go far in the darkness, nevertheless their behaviour made an extremely unpleasant impression, heightened as it was by hunger, cold, and weariness. Meanwhile, M. Mushketof and his party hacked their sledges to pieces, broke off the handles of their instruments, in fact used all the wood they could get, to make a fire and cook their food in order to refresh themselves a little. These preparations soon attracted the mutineers, and after a distribution of rations peace was restored. There was no fear of an open attack, for

these people are timid and have too much respect for Russian strength to venture upon such a course. The third day's march was nine miles, a great distance under the above-mentioned circumstances. The fourth and last day, with great exertion, a descent from the glacier was effected, its length on this side proving to be only four miles.

The Zardalya glacier descends very abruptly in a deep granite ravine, and consists of three principal branches which very recently formed one, but at present a right branch has retreated so as to detach itself, and form a distinct glacier; the left arm is still united with the centre. The left glacier apparently crosses a granite spur and unites with the Isfara glaciers, the right and centre unite with the Zarafshan. Owing to the absence of a wide amphitheatre and the steepness of the narrow defile, i. e. purely topographical conditions, the Zardalya glacier does not reach nearly so low a level as does the Zarafshan, for while the lower end of the Zardal is 11,600 feet, that of the Zarafshan is 9000 feet, or 2600 feet lower. A comparison between these two glaciers, in like manner as did that between the lateral branches on either side of the Zarafshan, shows very plainly the influence of topographical conditions on their size, a phenomenon by no means new, for it has already been observed in the Alps, but illustrated here in the clearest and most convincing way. All the glaciers indeed of the region described are in precisely similar conditions as regards temperature, aerial deposits, wind, &c.; their difference wholly consists in the form of their amphitheatres and valleys, and yet this apparently immaterial difference affects their relative size in such an extraordinary degree, as shown by the Zarafshan and Zardalya glaciers, as well as by those of Rama, Farakhnau, Tolstof and Yarkitch, Porak, Akhund, and others. The same topographical influences may also explain some oscillations in the height of the lower ends of the glaciers, which of course vary with the configuration of mountains and valleys, and these are in their turn affected by waste and denudation of rocks. . . .

Thus the entire length of the Zarafshan-Zardalya glaciers is about 20 miles. From the lower end of the Zardalya extend vast accumulations of débris lying in three principal rows continuously to a height of 10,000 feet, i. e. nearly to the mouth of the Utren, and on the lower course of that river is a whole system of comparatively small glaciers also visibly receding. After four days on the glacier they were glad to meet with even the filthy encampments of the Kara-Kirghiz, who were not a little astonished and alarmed at their appearance from the Matcha Pass, not believing it possible for any one to cross from the Matcha side or Upper Zarafshan, particularly peaceful individuals, and convinced that none but robbers intent on plundering and securing rich booty would have attempted to descend this almost impracticable pass. Soon, however, their fears were allayed by the slaughter of three sheep, and the travellers forgot their fatigues. The 17th August, the day after

this improvised feast, M. Mushketof bade adieu to the kindhearted Matchinians, who did not hesitate to return the way they had come, preferring its difficulties to the encounter with Kara-Kirghiz, whom they dread as merciless robbers.

M. Mushketof had still a few versts farther to proceed on foot along the Zardalya valley before meeting, near the mouth of the Tarak, the saddle-horses sent for his party. With these they continued their journey. The deep valley of the Zardalya is at first composed of granite and gneiss, lower down of schists and mountain limestones, and lower still, near the confluence of the Zardalya with the Sokh, of sandstones and schists of the York series. On the slopes of this deep valley several other glaciers could be traced: the Kalta-kain, Kashka-su, &c. All are rapidly retreating, and their old moraines are much lower than the modern. The lower end of the Kalta-kain glacier almost reaches the foot of the valley; its former activity was apparent in the huge moraine which blocks the whole width of the valley like a dam. Here the valley narrows, and the river Zardalya, hitherto flowing a tranquil current, divided into many arms, collects into one mighty stream and bursts through the moraine near the left side, forming the picturesque and powerful waterfall of Kalta-kain. The mass of water as it dashes down from ledge to ledge is broken into the finest spray, and for about two miles presents the appearance of the curly fleece of an arkari or wild mountain sheep, a feature suggestive of the well-known Imatra fall in Finland. The fall, about 800 feet in a little over three miles, is unusually fine, and may be reckoned almost unique in the Tian Shan, where these phenomena are generally scarce. The topographical conditions of the valley of the Zardalya at Kalta-kain and of the moraine where the river forces its passage, led to the conclusion that the waterfall is caused by the glacier in the vicinity and the altered rocks in this part of the valley, that is to say, the replacement of the gneiss by the more friable slates.

The village of Sokh was only reached by the party on the 20th August (1st September), after they had accomplished 4500 feet of descent. Here their caravan, which had crossed the difficult Yanghi-Sabak Pass, met them. Then came a period of sickness, each of them taking it in turns to suffer either from slight inflammation of the eyes or fever.

Summarising the scientific results of his expedition, M. Mushketof says:

1. The Zarafshan glacier may be traversed though with difficulty. Its length to the pass is 16 miles. The lower end is 9000 feet, the upper 14,000 feet high.

2. It unites with the glaciers of the Zardalya, and their combined length is 20 miles; it therefore belongs to the class of glaciers characteristic of the Alai.

3. Fedchenko supposed that the névés of the Isfara and Zarafshan

glaciers were united. This does not prove to be the case; they are only connected by branches, and their principal stems are distinct.

4. The great Zarafshan trunk glacier issues from an extensive *Firn* or *névé*, large enough by itself to account for the size of this glacier, which is still further increased by numerous lateral tributaries descending from the Turkistan and Hissar ranges, and adding largely to the accumulations of moraine drift with which the lower half of the glacier is entirely covered.

5. The right and left tributaries are as distinct in character as the glaciers of the Zarafshan and Zardalya. This distinction, other conditions being precisely similar, depends exclusively on the topographical character of their amphitheatres, and the diversity of structure of the Turkistan and Hissar ranges.

6. All the glaciers of the Zarafshan, as well as those of the Zardalya and Sokh, exhibit the same phenomenon of retrogression observed in other glaciers of the Tian Shan and Pamir, as evidenced by their enormous terminal moraines and local traditions. In the recent past the Zarafshan glacier was incomparably greater, deeper, more massive and longer by 30 miles, so that it reached to the villages of Paldorak and Diaminor. M. Mishenkof's theory that the glacier is lowering is therefore refuted.

7. The Turkistan range is the immediate continuation of the granite-gabbro Alai range, and ought not therefore to have a distinct name.

8. The Hissar range is of more recent formation than the Turkistan, and is separated from it by chalky formations, which extend along the valley of the Zarafshan to the village of Postigau; it is built up of granite, gneiss, and metamorphic rocks. It begins as a separate chain to the west of the mountain mass of Karamuk, consisting chiefly of diabase. This tangle of mountain chains is not caused by the interlacing of the already mentioned ranges with the Trans-Alai, but is the result of denudation by aqueous action.

Besides the above-mentioned conclusions, the expedition brought back geognostic collections, a survey of the glacier, and a number of sketches showing better than any description the external appearance of the glacier and its surrounding mountains. The success attending their investigations was greatly due to fine weather. One moderate storm would have disorganised their plans, and perhaps been fatal to them.

The following discussion ensued on the reading of the above paper on M. Mushketof's ascent of the Zarafshan glacier, at the Evening Meeting, March 12th, 1883:—

Sir Douglas Forsyth said although he had not actually been in the Zarafshan Valley he had travelled, perhaps, as near to it as any Englishman could go, namely, Kashgar, and had traversed the mountains to the south, the character of which was very similar to that described in the paper. Evidently the Russians had their pet glaciers, but there were some on the British side of India which would bear

comparison with them. The writer of the paper had stretched his glacier by taking the two sides and making it 20 miles, but on the Indian frontier there was a glacier 30 miles long on one slope and 30 on the other, making 60. He could only speak of these things in a very unscientific way, but he was particularly struck during his journey to Kashgar at the absence of glaciers on the slope towards the north-west of the great range. Of course that would be explained by the absence of all humidity in the desert; and what snow did fall in winter about Kashgar and Yarkand was dried up almost immediately, the atmosphere being so very dry. With regard to the retrogression of the glaciers, he went over the Sasser, which was about 30 miles long. There they had to cross enormous crevasses, and it appeared as if each time they had to get down to the bed of the river and then ascend. It was like going up a large mountain, but underneath the moraine was the débris of the mountains which had been gradually brought down, and as the melting operation went on the moraine settled down upon the bed of the valley, and it appeared as if the glacier was receding. The Tajiks, spoken of in the valley of the Zarafshan, were the more settled natives of the Aryan type. They were quite distinct from the nomad Kirghiz, who travelled over the mountain tops of the Pamir, and always lived in huts. He had met them, and travelled with them, and on one occasion lived with them for about three weeks. He found them most hospitable and agreeable people to deal with. Some of them were stated to be robbers, but he fancied they were not much worse than their neighbours.

Colonel H. H. Godwin-Austen said the Meeting was exceedingly indebted to Mr. Delmar Morgan for bringing before them the work of Russian scientific men in Central Asia. No doubt there was a great deal done in Russia which it would be of great interest to Englishmen to learn, and he hoped that Mr. Morgan would continue his labours in that direction. The subject of the glacial action in those and other regions had been written about by our ablest and best geologists and geographers, such as De Saussure, Murchison, Lyell, Tyndall, Forbes, Ramsay, Hooker, and others. In Asia glacial action was found on its grandest scale, particularly in the Himalayas. The glaciers of the Himalayas might be very well divided into three distinct groups. The first consisted of the small glaciers—almost frozen snow-beds—which were common in all high parts of the range. The second were the glaciers which filled lateral ravines reaching down into a main valley but not proceeding any further; and the third were large trunk glaciers, with which the lateral glaciers from side valleys joined at different points. Glaciers of the latter kind were only found in the Himalayas, near the Kara-korum and Mustakh, and in the range of Zarafshan. He was not sure that the glaciers north of Wardwan and along the range of the Mid Himalaya were not, in point of beauty and grandeur, quite equal to such as those described in the paper. They were certainly most striking from the steep slope at which they came down from the ridges above. The first Europeans who noticed the glaciers of the Himalayas or the Mustakh were Mr. Vigne, who visited that country in 1834 and 1838, and Dr. Falconer and Dr. Henderson in 1838; the former went to Arundo and over the Scoro La to Askole, and saw the end of the Biafo glacier. In 1857 Adolph Schlagintweit made an attempt to get into Yarkand by the Mustakh, but had to retire in consequence of the snow and severe weather. That unfortunate traveller was afterwards killed in Yarkand. Previous to 1860 and 1861 the exact length of those glaciers was unknown, till the topography of the country was taken up by the Surveyors under Captain Montgomery. In January 1864 Dr. Falconer, speaking at a meeting of the Society on a paper which he (Colonel Godwin-Austen) had written on those glaciers, was of opinion that the glaciers of the Zaskar range were as large as those of the Mustakh, but as he had only seen the terminal portions of the latter, and had never gone up them, he was

quite unable to judge of their enormous size. The Baltoro glacier was 35 miles long, measured as the crow flies, from where it took its rise to the terminal moraine or cliff. The Arindo glacier was 30 miles long, and descended to 9000 feet, which curiously enough was the same altitude as the end of the Zarafshan glacier. The conditions of their formation must therefore be very similar. The Punmah glacier, 23 miles long, descended to 10,300 feet; the Masherbrum, on the south range, 10 miles long, descended to 11,500 feet. The Kondus glacier, which was surveyed by Mr. Ryall, one of the assistants of the Survey, was 23 miles long, but he did not know to what altitude it descended. South of Zaskar, where the glaciers were of the second order, none of them filling the main valley, were the Muni La, 12 miles long; the Durang Drung, 14 miles; the Brahma, 10 miles; the Purkutze in Suru, 8 miles. The Muni La descended to 10,450 feet; the Durang Drung to 13,200 feet; the Brahma, to 12,500 feet; and the Purkutze to 11,780 feet. The difference of level to which the glaciers descended in that part of the range, as compared with the Mustakh, was quite 2000 feet. In Switzerland, the Aletsch, 15 miles long; the Görner, 9 miles long; and the Mont Blanc glacier descended to about 3600 feet. No doubt many of those present had been in the Rhone valley, and visited Zermatt and other places. The distance between the ridges in Switzerland, taking the crests of the range on one side and on the other, and also the crests of the lateral spurs, was from 10 to 12 miles; and in the Mustakh the distance was 12 miles, and of the lateral spurs from five to six miles. The width of the valleys was also very much the same as in the Rhone district, being from 1¼ to 1½ miles, showing that the conditions which existed at one time in Switzerland were precisely the same as those now existing in the Himalayas. The Baltoro glacier would fill the Rhone valley and its tributaries down as far as Raron, five or six miles below Visp, close to where the Lotschenthal stream joined the Rhone. The paper had referred also to the extension of glaciers in the Zarafshan Valley below the present points to a distance of 30 miles. Exactly the same thing was seen in the Himalayas, but many of the glaciers there must have extended for 100 miles below their present terminal cliffs, there being ample evidence of that in the striæ marks in the valleys, and the old moraines.

Mr. Douglas Freshfield said he had listened with very great pleasure to the paper, because some years ago he had, with two friends, taken some pains to initiate the Russians in the art of glacier exploration in the Caucasus. The paper had borne evidence that the glaciers in Central Asia were, like those in the Alps and in the Caucasus, in retreat. It was not clearly stated in the paper whether the ancient moraines were countless centuries old, like those round the foot of the Lago di Garda, or only twenty-five years. But he understood M. Mushketof to mean that in the Zarafshan Valley the glaciers were at present in retreat, not merely that a retreat had taken place since remote ages. It might be considered, therefore, that this retreat was going on over the whole of the old world. But it must not be hastily assumed it would last. So far as the Alpine glaciers are concerned, evidence has of late years been collected proving that they have in previous centuries retreated as far as at present and again advanced. No definite period can as yet be assigned to these oscillations. The Russians did not seem as yet to have got very far in glacier knowledge. Both in scientific and practical matters they were still rather below the level of Western Europe. The author had given an account of dirt-heaps which it was impossible to accept. They were caused by the thickness of the earth-covering in certain spots protecting the ice beneath from the sun's rays, and thus raising the surface above the general level. Again, the difference in character between the smaller tributary glaciers on the two sides of the main stream could not be caused by the ice on one side being much older than that on the other. It

was probably caused by the range on one side being granite and on the other a schistose or friable rock. The author had ventured to give some advice as to the kind of boots to wear in glacier exploration, stating that there was nothing like the soft boots that the natives wore. It was very true that for difficult rock climbing such boots, which are used by peasants in the Pyrenees, are very good, but they fail on ice, and a mountaineer must be prepared to change many times a day from rock to ice. The question of how far the Russians had studied the practical needs of glacial exploration might seem trivial. But a sad point was given to it by the circumstance that the distinguished predecessor of M. Mushketof in Central Asian exploration, M. Fedchenko, perished on the Mer de Glace in Savoy under circumstances in which an experienced glacier explorer would have probably escaped. He started inadequately clad, and was caught in a storm which proved fatal to him. The small extent of the glaciers on the northern side of the Alai range, where there was comparatively little rainfall, reminded him of the fact that at the eastern end of the Caucasus chain, where also but little rain fell, there were but few and small glaciers, while at the other end there were immense glaciers, descending on the southern side almost as far down as on the northern side, the extra snow-fall caused by the vicinity of the Black Sea more than compensating for the warmer exposure. He did not agree with Sir Douglas Forsyth that it was probable that the mounds below the level of the present glaciers in Central Asia were not the moraines of ancient glaciers. It was generally not difficult to distinguish such moraines from hillocks left by drift.

Sir Henry Rawlinson said that in the course of his Central-Asiatic studies the district of Zarafshan had always had a particular attraction for him, involving as it did so many questions of interest ethnologically, geographically, historically, and politically. The valley of the Samarkand river was the cradle of the Perso-Aryan race. In the Zoroastrian Genesis, after the exodus from the mythic paradise of *Irán-víj*, it was said that the first place created by Ormazd for the Aryan race was in the valley of Sugd, or the Zarafshan Valley, and the Aryan population had remained there from that time to the present, a period, at the lowest calculation, of 6000 or 7000 years. In the Vendidád the valley was called Gau,* Sugd being the name of the river. That was modified by the Arabs to Jái, and the name was retained to the present day, being applied to a famous lake called the Iskanderkul, or by the geographers *Bán-jái*, which was one of the sources of the Zarafshan. It was a most romantic and picturesque spot, and was first visited by two Russian travellers, Khanikoff and Lehmann in 1842, who were attached to Butenef's Bokhara mission, and who subsequently published a very interesting description of the lake. The Fáns were a very old tribe, probably Aryan, who must have held all that part of the country in the time of Alexander, and who gave their name to all the prominent local features, the mountains south of the Zarafshan Valley being called *Fán-táú*, the lake at the source of the river *Fán-jái* and the neighbouring lake country *Fán-mír*, whence *Fámír* or *Pámír*.

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* *Gau* (acc. *Gaum*) is translated by Bournouf "terra," being compared with the Sans. *Gô*. Darmsteter reads "the plains." See Yacna, notes, &c., p. 50, and Sacred Books of the East, vol. iv. p. 5. It is, however, undoubtedly a proper name like *Vaekereta* and *Khnenta*, in the same chapter of the Vendidád. For the Arabic form of *Jái*, which is the regular substitute for *Gau* (as in the old name of Isfahan, *Jái* for Γαβαι i.e. Gâu), see Istakhri, p. 219, and Ibn Haukal, p. 368. In Yacút the name is misprinted *Vái* and *Qái*. In Edrisi alone, I believe, is found the full form of *Bán-jái* for *Pán-jái* or *Fán-jái*, i.e. *Jái* of the Fáns, whom I take to be the Φαννοι, said by Strabo (p. 516) to form the extreme limit of the Greek conquests in Bactria.

Historically, too, this valley was one of the most celebrated in the world, Samarkand being the place of sepulture of the great Timour. As far down as Bokhara the whole country was a garden, with an unlimited supply of water, a rich alluvial soil, and an admirable climate. It always had teemed with population, and was quoted as one of the four earthly Paradises. The Russian Government had shown great skill and judgment in taking possession of Samarkand, and not of Bokhara. By holding Samarkand and the upper valley of the Zarafshan, she really held the lives of the inhabitants of Bokhara at her disposal, being able at any time to turn the water of the river into the desert, and so deprive them of the means of subsistence. She had therefore a complete control of the people of Bokhara. At present the boundary between Samarkand and Bokhara was about half-way between the two towns, and Russia had shown no indication of going further to the west. Politically, again, the district of the Zarafshan was very important, being the nearest point of the Russian possessions to the Indian frontier. It was indeed considerably nearer to Peshawer than the Askabad frontier was to Sinde or Quetta, being about 400 miles in a straight line. Very great praise was due to Russia—and all geographers would be glad to acknowledge it—for her scientific explorations. She might have other objects in view, but geographers would look merely at the scientific results, and those were of great value, for she had explored, surveyed, and mapped the whole of the country along her frontier between the Jaxartes and the Oxus. He could only wish that England had done as much with regard to her Indian frontier, instead of leaving an enormous tract of country between the Indus and the Oxus of which they really knew nothing, except the lines of route along which the troops had passed. He did not mean that there were the same facilities for surveying Afghanistan as for surveying the Pamir and the Hissar range, but still he thought more ought to have been done by England for geography in the same direction as Russia. The region intervening between Samarkand and the Oxus was an exceedingly interesting one, but very little was known about it till the Russians went there. In Oriental histories accounts were often met with of marches through that region, though not with the details which the Russians had now supplied. The Arabs, for instance, had given wonderful accounts of volcanoes to be found there, and had stated, in fact, of one part of the country that it was a series of volcanoes on fire. Humboldt and physical geographers generally had looked upon this story as a fable, but Lehmann and Khanikoff when they went there found to their astonishment that a large tract of country near the Iskander-kul of ten or fifteen square miles was absolutely on fire, these subterranean fires being explained either by the existence of anthracite coal or by the saturation of the soil with petroleum or naphtha. Of late years nothing more had been heard of the phenomenon, but an account of it was published in Lehmann's work. The route across the mountains from the lake to Hissar was the proper high road from Samarkand to the Upper Oxus, as, if that route were not followed, the traveller would have to make a very long circuit to the westward, increasing the distance from 200 to nearly 400 miles. It had consequently been a great object to find a practicable way across the hills, and lately some Russian officers had thus passed over the hills direct fro[illegible] ke down upon Hissar, opening up a route that would ultimately no doub[illegible] high road from Samarkand to India, for although it was difficult it [illegible] shortest and the best [illegible]
In discussing this subject of Ce[illegible] ation, a tribute [illegible]
memory of an Englishman, Mr [illegible]
He was the first Englishman [illegible]
Tibet to the plains of Tarta[illegible]
and he subsequently (in 1[illegible]
ciation of his services to g[illegible]

Ilchi or Khoten, and did a great deal of very good scientific work in connection with the Himalaya Survey. Sir Henry believed that both Sir Douglas Forsyth and Colonel Austen were acquainted with Mr. Johnson personally, and could thus speak with more authority on the subject. But he thought it only proper that on this occasion he should refer to the great loss which geography had sustained by Mr. Johnson's untimely death.

The PRESIDENT said Sir Henry Rawlinson had borne generous testimony to the labours of Russian travellers, and to the great flood of knowledge they had thrown upon regions previously little known. But before them the ground had been traversed in a more southern direction, and there were symptoms of what had been called the restless foot of English adventure in a lake in the centre of the lofty regions described by Sir Douglas Forsyth, bearing the name of the Victoria. A debt of gratitude was due to Mr. Morgan for bringing before them so graphic and accurate a description of travel in an unknown region. Mr. Morgan had resided much in Russia, and was a member of the Imperial Russian Geographical Society. It was of the greatest possible advantage to have such a connecting link with a people who were doing so much for geography as the Russians. The Russians did not look with a favourable eye upon other travellers, but they were doing their best to explore the regions themselves, and to make known the results of their researches.

# PROGRESS OF DISCOVERY

ON

# THE COASTS OF NEW GUINEA.

By C. R. MARKHAM, C.B., F.R.S.,
SECRETARY R.G.S.

WITH

## BIBLIOGRAPHICAL APPENDIX

By E. C. RYE, F.Z.S.,
LIBRARIAN R.G.S.

# PROGRESS OF DISCOVERY

ON THE

# COASTS OF NEW GUINEA.

By C. R. Markham, C.B., F.R.S., Secretary R.G.S.

(Read at the Evening Meeting, February 25th, 1884.)

As geographers are likely to become more closely acquainted with the great unknown interior of New Guinea and with its coasts, in the near future, it has been thought desirable, in accordance with a good old custom of this Society, to take stock of our existing knowledge. Mr. Coutts Trotter, whose careful work as a comparative geographer is well known to us, has prepared an exhaustive paper for publication in our 'Proceedings,' to be illustrated by a map and by a complete New Guinea bibliography. But our President has also considered it likely that a briefer review of the progress of discovery along the New Guinea coasts would be interesting to a geographical audience at one of our evening meetings. We can only attempt to pass the array of voyagers and explorers in review, while dwelling for a moment on the kind and amount of work done by each. Time will not admit of more than that, but with the map before us, we shall, I think, find even such a brief review both useful and interesting. If it does no more, it will help to fix in our minds the origin of the names of capes and bays, of mountains and promontories, which will, no doubt, become very familiar to us as discovery progresses. At the same time, a clearer idea of the history of what has already been done will make the narratives of further exploration, which must soon be reaching us, more intelligible and more interesting.

The discovery of New Guinea was due to the competition for the possession of the Spice Islands between the two nations which pretended to divide the world: for the Papal Bull declared that Spain was to have all to the west, and Portugal all to the east of a meridian drawn in the Atlantic. But it was no easy matter to decide the line where the two all-grasping nations met on the other side of the world. It was long disputed whether the famous Spice Islands, so anxiously coveted by both, were on the Spanish or Portuguese side of the line. It was a question of longitude, which was only guessed at in those days by the

roughest dead reckoning. The Portuguese sought the Moluccas, or Spice Islands, from India and Malacca, the Spaniards by sailing across the Pacific. It was inevitable that there must be a collision where the two ambitious peoples met, and that the discovery of New Guinea—lying right in the way of vessels coming to and fro from America—would be the consequence.

Magellan, in his memorable voyage, led three ships across the Pacific in 1521; and when, after his death, Sebastian del Cano brought the *Victoria* round the Cape, and achieved the first circumnavigation in 1522, he reached and traded at the Spice Islands, but did not sight New Guinea. The Portuguese were already established at Ternate. The success of Sebastian del Cano led to his being despatched on a second voyage to the Spice Islands, by Magellan's Straits, in 1525. In August 1526, the first circumnavigator died, and was committed to the deep in the centre of that Pacific Ocean which he had been the first to sail over; but the ship went on, and Don Martin Yniguez, who had succeeded to the command, brought his Spaniards to the Spice Island of Tidore. The Portuguese were at Ternate, which is in sight from Tidore, and soon there was open hostility between the rivals.

In the course of this rivalry, New Guinea was discovered. In 1511 the Portuguese Antonio de Abreu had made a voyage from the Aru Islands to the Moluccas, and had possibly sighted the coast of New Guinea. But it was Don Jorge de Meneses, a Portuguese commander sent from Malacca to take charge at the Moluccas in 1526, who was the actual discoverer. The usual route from Malacca was by the south of Borneo and Celebes. Meneses tried a new route by the north of Borneo and Gilolo, far overshot his mark, and came to a land inhabited by a curly-headed black people, called *Papuas*: a name given to them by the natives of the Moluccas, on account of their woolly hair. Meneses remained at an island, called by him *Versija*, on the equator, until the change of the monsoon, arriving at Ternate in May of the following year. He must have been at some anchorage near the point now called Cape Good Hope, the most northern point of New Guinea, possibly at Dorey.

Of course Meneses little dreamt of the significance of his discovery, that he had reached the largest island in the world save one—covering 306,000 square miles, 1500 miles long by 500 broad, as large as France and Great Britain put together; and that it yet would be more than three centuries and a half before any serious attempt would be made to explore its interior.

No thought of all this occurred to Meneses touching his discovery, when he gladly shaped his course away from New Guinea, and reached Ternate; to find the Spaniards still in force at Tidore, under Hernando de la Torre; for the good Martin Yniguez had died in the interval.

Meanwhile, the conqueror of Mexico, Hernan Cortes, equipped an

expedition to co-operate with the Spaniards at the Spice Islands, under the command of his kinsman, Alvaro de Saavedra. Saavedra reached Tidore in June 1528, and on his return voyage, he coasted along the whole northern shore of New Guinea, which he called the golden island—"Isla de Oro." He sighted New Guinea during a second voyage in 1529, dying on the return passage to Mexico.

By a treaty in 1529, Charles V. sold the Spanish claim on the Spice Islands to the crown of Portugal. Still the Spaniards sent three more expeditions across the Pacific, which reached New Guinea.

When the Yncas of Peru made their memorable attempt to drive out the Spaniards in 1536, Pizarro sent to Mexico for help, and Hernan Cortes promptly despatched two vessels under Hernando de Grijalva and Alvarado. After landing the reinforcements, Grijalva sailed from the Peruvian fort of Payta in April 1537, and crossed the Pacific Ocean. He refused the demand of his crew that he should break the treaty by crossing the Portuguese line and steer for the Moluccas, upon which there was a mutiny and Grijalva was murdered. Eventually the ship was wrecked on the north coast of Papua, the survivors became prisoners to the natives, and were generously ransomed and released by the Portuguese commander at the Moluccas. That commander was Antonio de Galvano, the author of the 'Discoveries of the World.'

Yet another expedition was despatched from Mexico to cross the Pacific under the command of Ruy Lopez de Villalobos, a good sailor, and a brother-in-law of the Viceroy, Don Antonio de Mendoza. Villalobos sailed from the west coast of Mexico in the end of 1542, and took formal possession of Mindanao for the Emperor Charles V. in February 1543. It was Villalobos who first gave the name of "Filipinas" to the Philippine Islands; but he acknowledged the right of the Portuguese to the Moluccas. At the same time he went to Tidore, whence he despatched one of his vessels, the *San Juan*, to Mexico, under the command of Yñigo Ortiz de Retes, in May 1545. Retes sailed for many leagues along the north coast of New Guinea, and it was he who gave the name. Galvano says, "Retes knew not that Saavedra had been there before, so he challenged the honour and fame of that discovery. For the memory of Saavedra was then almost lost, as all things else do fall into oblivion, which are not recorded and illustrated by writing."

Thus it was that Retes changed the name of Saavedra's "Island of Gold," the "Papua" of Meneses, and called it "New Guinea" because the black and woolly haired people reminded him of the negroes he had seen on the coast of Guinea. Retes anchored in several forts, and found wood and water; but he was unable to make his way much further eastward, and returned to Tidore. Villalobos died at Amboyna, and his people were sent home by way of India, by an agreement with the Portuguese.

Unfortunately, the journals of these Spanish voyages have not been

discovered; and the few facts that have been preserved can only be gathered from general historians—namely Argensola, Barros, Galvano, Herrera, and Gomara.

Thus the northern coast of New Guinea was discovered during the sixteenth century. Its southern side and the distance it extended to the south was unknown. Yet Ortelius, in his edition of 1587, has a map entitled "Typus Orbis Terrarum," on which New Guinea is conjecturally made an island, with the words "Nova Guinea quæ an sit insula aut pars continentis Australis incertum." A great southern continent was assumed, and in subsequent maps New Guinea was generally connected with New Holland by a line forming a great bay.

The seventeenth century opened with the important discoveries of Luis Vaez de Torres, the second in command in the expedition of Quiros, which sailed from Callao to discover the great southern continent in December 1605. Quiros reached an island in the New Hebrides, which he named "Australia del Espiritu Santo," supposing it to be part of the continent of which he was in quest. But, for some unexplained reason, he made sail from this island at midnight of the 11th of June, 1606, leaving Torres to prosecute the voyage. In July Torres fell in with a coast which he rightly assumed to be the eastern extremity of New Guinea. He made a survey of the large bay, since named Milne Bay by Captain Moresby, on July 18th, 1606; but as the existence of his map was never made known until 1878, it does not detract in the slightest degree from the merit of Moresby's discovery. Being unable to pass to windward, Torres bore away along the south side of the land for many leagues, in an archipelago of islands without number, and he was engaged in this intricate navigation for two months. He had discovered the strait between New Guinea and Australia, which at length bears his name, but it was several scores of years before his report and his maps were made public, and the memory of Torres received the credit that is his due. A copy of the report of Torres was lodged in the archives of Manilla, and was discovered by the hydrographer Dalrymple, when Sir William Draper took that city in 1762. Sir William is best known to us in connection with his literary duel with Junius. Geographers should remember him for having been the indirect means of justice being done to Torres. Dalrymple brought home the Report, and very properly gave the name of "Torres Strait" to the channel between New Guinea and Australia, which it still retains. Translations of the Report were published in Burney's Voyages, by Mr. Major in his 'Early Voyages to Australia,' and by Lord Stanley of Alderley. The original is at Simancas, dated July 12th, 1607, and is reprinted in the *Boletin* of the Madrid Geographical Society for January 1878. In the same number are published the maps drawn by Diego de Prado y Tovar, one of the officers of Torres; and one of these maps delineates the Milne Bay of Moresby, and adjacent islands; another shows Triton Bay of the Dutch.

By making a secret of the important discoveries and surveys of Torres, the Spaniards did their best to annihilate the fame of one of the most illustrious of their marine worthies. Justice was first done to his memory more than a century and a half after his death, by the Englishmen Dalrymple and Burney; and more tardily a century later, by his own countrymen.

The opening of the seventeenth century saw the Dutch power rising on the ruins of the Portuguese colonial empire in the Eastern Archipelago. The first Dutch expedition to New Guinea was contemporaneous with the voyage of Torres. The *Duyfken*, under the command of Willem Jansz, sailed from Bantam in 1606, visited the Aru and Ki Islands, sailed along the west and south coasts of New Guinea, then southward along the islands on the west side of Torres Strait, to the coast of Australia south of Cape York. But all these lands were believed by the commander of the *Duyfken* to be connected, and to form the west coast of New Guinea. Yet in the very same year Torres had sailed through the strait which bears his name. Subsequent Dutch voyages from Banda to the western shores of New Guinea were numerous, but their objects were merely the development of trade. Schouten and Le Maire, the first navigators who ever rounded Cape Horn, sailed along the north coast of New Guinea in 1617, and discovered the Schouten Island at the entrance of Geelvink Bay.

The memorable voyages of Abel Jansz Tasman in 1642 and 1644 are important as regards the history of New Guinea discovery, because the instructions drawn up for the explorer's guidance, first published in English by Dalrymple, contain a summary of previous Dutch voyages.

In 1663, Nicholas Vinck was the first to describe the deep inlet afterwards explored and mapped by Lieutenant McCluer: and in 1678 Johannes Keyts sailed to New Guinea in a vessel called the *Saxenburg*, and explored several bays along the west coast. His journal was published for the first time in full, by Major Leupe in 1875.

We now come to the expedition sent forth by the English Admiralty of William III., solely with the object of discovery. No better man could be found for such work than the famous buccaneer William Dampier, who was wisely selected in 1699, and sailed from England in an unseaworthy old tub—H.M.S. *Roebuck*. After visiting the west coast of Australia, Dampier sighted New Guinea on the 1st of January, 1700. He sailed round the eastern end of the great mass of land which he named New Britain, and which he discovered to be separated from New Guinea by a strait known as Dampier's passage. On the island of New Britain are Capes Anne, Gloster, and Orford, on the opposite coast King William's Cape, and Sir George Rooke's Island in the channel, all names which revive memories of the time when Dampier flourished.

Five years after the important voyage of Dampier, the Dutch despatched an expedition consisting of two vessels, the *Geelvink*, or yellow-

hammer, and the *Kraan-vogel*, or crane, under the command of Jacob Weyland. His orders were to proceed to Schouten Island, and survey the adjacent coasts. In 1705 he discovered the deep indentation on the northern coast, which he explored and mapped, giving it the name of Geelvink Bay, after his own ship.

While frequently despatching small exploring expeditions, the Dutch East India Company was extremely jealous of interlopers, even among their own countrymen. In 1616 they seized the ships of the circumnavigators Schouten and Le Maire; and in 1722 when another bold voyager, Jacob Roggeveen, arrived at Batavia, after having crossed the Pacific and coasted the northern shore of New Guinea, he received similar treatment.

Dampier was the first Englishman who entered the field as a New Guinea discoverer. He was followed, in 1767, by Captain Carteret in the *Swallow*, who discovered the channel separating New Britain from New Ireland. Captain Edwards in 1791, Captains Bligh and Portlock in 1792, passed through Torres Strait. Captain Cook made a valuable survey of Torres Strait; and he was followed by Captains Bampton and Alt of the East India Company, who visited and described several islands in Torres Strait, and explored to the head of the Gulf of Papua in 1793. Captain Forrest, another captain in the service of the East India Company, undertook a voyage to New Guinea in 1774, in a little native craft of 10 tons, called the *Tartar*; and he afterwards published an interesting narrative of his voyage. He landed at Dorey, near the western entrance of Geelvink Bay. This place has a well-sheltered anchorage, an open cultivated and well-watered tract sloping gently up to the forest, which is composed of great trees without underwood, while behind there are the lofty mountains of Arfak. On the adjacent island of Manaswari he discovered the nutmeg tree, and he speaks of the great value of sago as a means of subsistence. Owing to his wise and conciliatory conduct, the intercourse of Captain Forrest with the natives, during several weeks, was always friendly and pleasant.

One other servant of the English East India Company is connected with New Guinea discovery, and his romantic story should form a part of our record. One is reminded of it by McCluer Inlet—the great inlet which is such a marked feature on the western coast. John McCluer was one of the earliest of our Indian Marine Surveyors, the resulting charts being prepared by his assistant, Lieutenant Wedgborough. An accident connected him with work beyond India. In August 1783, the East India Company's vessel *Antelope*, commanded by Captain Henry Wilson, was wrecked at the Pelew Islands. The natives treated the officers and crew with great hospitality, assisted them in building a small ship, and when they sailed in her for Macao in the following November, Captain Wilson took with him a son of the King of the Pelew Islands, named Prince Lee Boo. I think most of us must

have read about him in the 'Child's Own Book.' He was taken to England, and died of small-pox at Rotherhithe on December 27th, 1784.

A few years afterwards Lieutenant McCluer was ordered to proceed to the Pelew Islands to report the death of Prince Lee Boo. He was in command of two vessels, the *Panther* and the *Endeavour*, with Lieutenant Wedgborough as his second in command. They sailed from Bombay in August 1790, and conveyed the sad news to the father. McCluer's further instructions were to survey the western coast of New Guinea, and ascertain whether the inlet discovered by Vinck in 1663 was a channel leading through to the southward. Leaving the Pelew Islands in February 1791, he was engaged on the survey until the following December, exploring and mapping the long inlet which is now known as McCluer Bay.

The *Panther* then returned to the Pelew Islands, where McCluer took a very extraordinary step. On February 2nd, 1793, he addressed a letter to Lieutenant Wedgborough, resigning the command of the *Panther*, and announcing his intention of remaining on the islands. This having been arranged, Lieutenant Wedgborough assumed command, and returned to Bombay. The truth was that McCluer had been fascinated by the charms of the fair Pelew Islanders. He lived happily with them—not for ever after, but only for thirteen months, when he got anxious for news, and went in an open boat to Macao. There he bought a vessel, and prepared to return to the Pelew Islands for his family.

Just as McCluer was about to sail from Macao, in July 1794, Captain Hayes, of the East India Company's ship *Batavia*, arrived with the news that he had founded a colony in New Guinea, at a place called Restoration Bay. He requested McCluer to go there with provisions, persuading him that it was not very far out of the way. McCluer first embarked his family at the Pelew Islands, and shaped a course to New Guinea, where he found the colony in a miserable state: twelve men being dead, fourteen prostrate with illness, and their ship unable to go to sea for want of necessary articles which McCluer could not supply He, therefore, went to Bouro, obtained what was required, returning to Restoration Bay. The ship was then got ready for sea, the colonists embarked, and McCluer parted company with them in March 1795. He proceeded to Bencoolen in Sumatra, in May, and sailing thence, neither he nor his ship were ever heard of again.

This episode in the history of New Guinea discovery, is, I think, of sufficient interest to justify the brief digression. The romantic career of the gallant surveyor will make the name of the great New Guinea Inlet convey to the minds of geographers something more than the mere name. The story is told partly in Keate's 'Pelew Islands' (supplement to later editions), and partly in some of McCluer's letters, which were found in the Archives at the Hague, by Major Leupe, and published in 1877.

We now reach the opening of the present century, when the great island was beginning to assume roughly its correct form on the maps. The delineation of McCluer Inlet and Geelvink Bay gave its peculiar shape to the western peninsula, while the voyages along the north coast, and the surveys of Cook and Bampton in Torres Strait, served to show the general outline of the main mass of land.

The long war prevented anything being done in the early years of this century; but in July and August 1827, the French expedition under Dumont D'Urville, in the *Astrolabe*, furnished us with the best observations we have, along the northern coast.* Astrolabe Bay, Humboldt Bay, and Cape D'Urville, are names due to his running survey; but the most interesting part of his description is that in which he mentions the delta of that great river Amberno,† near the eastern side of Geelvink Bay. For it is likely that this river will be an important route for exploration in the near future. He mentions the discoloration of the surface of the sea, the quantity of branches, fruit, and leaves floating out; and concludes that all this was caused by the outflow of some very large river. Bougainville observed the same phenomena, during his voyage in 1768, and came to the same conclusion. The point of land named Point D'Urville is at the extremity of the projecting delta.

Dutch discoveries and Dutch influence have been confined to the portion of New Guinea to the westward of the 141st meridian, where the Netherlands Government, as the Suzerain of the Sultan of Tidore, participates in his claims. These Moluccan rulers have long held supremacy over "Papua," that name being used to denote Salawatti and the adjoining islands at the extreme north-west of New Guinea. This sovereignty especially extends over what is called the "Raja Ampat," or four Papuan kingships, namely, Islands Waigiu (Waigheu); Salawatti; Misol, Waigama, both on Misol Island. For the last two centuries this sovereignty has been acknowledged by the payment of a tribute of sago, massoi bark, birds of paradise, and slaves; and by the investiture at the hands of the Sultans of Tidore, of some of the principal chiefs round the western extremity of New Guinea.

The Dutch first supported, and eventually assumed as suzerains, the claims of the Sultan of Tidore. They also have a claim to the south-western coast, from McCluer Inlet to False Cape, by right of discovery, as well as to Geelvink Bay. Between the years 1825 and 1845, this south-western coast, from 130° to 139° E., was examined in detail by Dutch exploring vessels. In 1826 Lieut. D. H. Kolff, in the brig *Dourga*, visited Timor Laut and the Aru Islands, and traced the New Guinea coast to False Cape. In 1828 the corvette *Triton* and

* Also D'Entrecasteaux, and Duperrey in 1825.

† Also called the Rochussen, in honour of the Governor-General of Netherlands India 1845–51. The delta extends from 130° 10′ to 137° 10′ E., and there are seven or eight mouths.

schooner *Iris*, under Lieut. J. Modera, were despatched on a similar service. The explorers made the coast of New Guinea on the 20th May, and entered the Dourga Strait, near Cape Valsche (False Cape), the north-west entrance to which had been discovered by Lieut. Kolff in 1825. The land was low, at a dead level, and covered with trees. One of the duties of the *Triton's* commander was to form a settlement, but as this part of the coast was very uninviting, the vessels left Dourga Strait and proceeded along the land to the north-west, tracing it for 230 miles. On the 11th of June they anchored at the mouth of the Utanata river, establishing pleasant and friendly relations with the natives; of whose appearance, dwellings, and weapons a full description is given by Lieut. Modera. Reaching Triton Bay, on the south coast of the Onin Peninsula, an extensive piece of marshy ground at the bottom of a large land-locked bay was fixed on as the site for a fort. The intended garrison was landed, and towards the end of August the stockade was completed, and named Fort Dubus. Immediately behind it there is a wooded mountain rising to a height of 2462 feet. The soil in the vicinity was rich, and the vegetable productions valuable, but the climate was deadly. The settlers had intercourse with two classes of natives, the *Papuas* or negroes of the coast, and the *Arafuras* of the interior. There was a brisk trade between the Papuas and the islanders of Ceram, carried on by means of *prahus* 15 to 30 feet long, and roofed over. The New Guinea products are massoi bark, odoriferous woods, nutmegs, trepang, birds of paradise, and edible birds'-nests.

On the 24th of August, 1828, Fort Dubus was opened with much ceremony, and possession of the coast from Cape Good Hope (132° 45′ E.) to the meridian of 141° E., on the south coast, was taken in the name of the King of the Netherlands. Many of the native chiefs were present, and swore allegiance to the Netherlands Government. Fort Dubus, in Triton Bay, is in 3° 41′ N. and 134° 15′ E.

In 1835, Lieutenant Langenberg Kool, in the *Siren*, discovered that the land on which False Cape is, was an island separated from the main by Dourga Strait. It was named Prince Frederick Henry Island. The mountains in sight from the coast, and said to be snow-covered, received the name of the Charles Louis Mountains.

Fort Dubus was abandoned in 1835, on account of the pestilential climate, but since that time, as often as circumstances require it, a Dutch officer is sent to adjust the claims and settle the disputes between the native chiefs and agents of the Sultan of Tidore. Besides the *Raja Ampat*, this sultan's jurisdiction is acknowledged over the four districts of:—Manaswari (island off Dorey); Karongdifer, Amberpoera (west side of Geelvink Bay); Amberpon (island west side of Geelvink Bay);—districts which had previously been confirmed to the Sultan of Tidore, as constituting his possessions in New Guinea, during the temporary occupation of the Moluccas in 1814, by ourselves. Subse-

quently the Dutch declared the Tidore jurisdiction to extend along the northern coast as far as Humboldt Bay, and all New Guinea to the westward of a line drawn from the north to the south coasts nearly along the 141st meridian. This appears from a rescript of the Governor-General of Netherlands India in 1848, and from the Government Almanac of Netherlands India for 1883. The Dutch territory is there described as comprising the north-western half of New Guinea, bounded on the east by a straight line drawn from Cape Bonpland on the east side of Humboldt Bay, in 140° 47′ E. on the north coast, to 141° E. on the south coast, with the adjacent islands.

It was through this intercourse with Tidore that New Guinea products and birds began to be known in Europe, and that New Guinea began to be thought of, by naturalists, as the land of the birds of paradise. Vessels from the Moluccas go to New Guinea every year, for tortoise-shell, mother-of-pearl, trepang, birds of paradise, and massoi bark. Skins of birds of paradise always came without feet, which led to the superstition that the birds themselves had no feet. I am told that Linnæus named one species *Paradisea apoda*. It was high time that naturalists should make acquaintance with the peculiar and very beautiful avi-fauna of New Guinea in its own habitat; and hitherto the western peninsula has been the principal locality for their researches.

Scientific missions were sent by the Dutch Government between 1871 and 1876, under P. van der Crab, J. E. Teysmann, J. G. Coorengel, A. J. Langeveldt van Hemert, and P. Swaan; the valuable results of which have been published by the Royal Institute of Netherlands India at the Hague, and edited by Robidé van der Aa.

Italian scientific explorers have also achieved very important results.

In 1870 the enthusiastic geographer Emilio Cerruti made a survey of Galewo Straits, between Salawatti and the main land. Dr. Odoardo Beccari and Signor D'Albertis reached an island in Galewo Strait in 1872, whence they made excursions to the main land of New Guinea. They afterwards explored the Arfak Mountains, the home of the birds of paradise, but D'Albertis was attacked by fever, and was obliged to retire to Sydney. In 1875 Dr. Beccari started on a second visit to New Guinea, with generous aid from the city of Genoa. He landed at Dorei Ham, ascended Mount Morait to a height of 3500 feet, and explored the course of the Wa Samson, the largest river on the peninsula, flowing westward from the Arfak Mountains. He then examined the whole curve of Geelvink Bay, and visited the islands in it; finally ascending the Arfak Mountains to a height of 7000 feet. The highest peak was found to be 9500 feet * above the sea. Dr. Beccari returned with immense natural history collections.

But perhaps the most complete journeys in this part of New Guinea were performed by Dr. Adolf Meyer in 1873. Our own illustrious

* So fixed by the officers of the *Coquille*.

naturalist, Mr. Alfred Wallace, resided at Dorey, at the western entrance to Geelvink Bay, for three months, and described the northern peninsula of New Guinea as very rugged and mountainous, while an unvarying forest spreads over the whole country. Dr. Meyer resolved to proceed in the first instance to Dorey, where Captain Forrest and Mr. Wallace had previously resided. He had a small hired schooner, and in her he visited the islands in Geelvink Bay, and the north-east end of the bay, where he mentions the great river Amberno as sending volumes of fresh water to the sea. At the head of the bay he resolved to try to cross the isthmus to the south coast, west of Utanata; but the country was uninhabited and he ran short of provisions. He, however, obtained a view of the sea to the southward from his furthest point, which was 3000 feet above its level. He learnt that to the eastward there was a large fresh-water lake, the shores of which are densely populated. Dr. Meyer afterwards succeeded in marching from Geelvink Bay to McCluer Inlet, which took him four days; in the course of which he crossed a chain of hills 2000 feet high. Finally he reached a height of 6000 feet on the Arfak Mountains. It was here that he obtained all those rare and splendid birds of paradise for which New Guinea is famous.

The work of Wallace, Beccari, and Meyer on the north-western peninsula of New Guinea has thrown a flood of light on the natural history and ethnology of this portion of the vast island; while our geographical knowledge has also been considerably extended. The Reports of the Utrecht Missionary Society, whose labours have been chiefly on the islands in Geelvink Bay, also contain much valuable information. Trade is regularly carried on between western New Guinea and other Dutch possessions, and steamers periodically touch, four times a year, at Skroë in McCluer Inlet. These voyages were inaugurated by the steamer *Egeron* under Mr. Hartog.*

The claims of the Netherlands on western New Guinea are based on the rights of the Sultan of Tidore, who acknowledges the suzerainty of the Dutch; on the right of discovery; on a formal act of possession; but chiefly on the constant trade and intercourse between western New Guinea and other Dutch possessions. A sense of justice led Mr. Wallace† to deprecate any attempt to ignore or cavil at these claims, a feeling in which I confess that I fully concur. If expeditions are undertaken to explore parts of New Guinea to the westward of the 141st meridian, it should be with the official knowledge and concurrence of the Netherlands Government. I believe that our own Government has recognised the Dutch claim by implication, as they defined the limits of the jurisdiction of our Commissioner in the Pacific, as regards New Guinea, at the 141st meridian.

* R.G.S. Journal, xlviii. p. 294. The *Egeron* discovered Egeron Strait, dividing Timor Laut into two islands.

† Ibid., xxx. p. 175.

The vast tract of country to the eastward of 141° east may now be considered as practically belonging to Great Britain. It is 850 miles long by nearly 400 broad, and is as yet almost entirely unknown. The southern coast of eastern New Guinea was explored by the surveying parties under Captain Blackwood, in H.M.S. *Fly*, in 1842. The western side of the Gulf of Papua was examined for 140 miles, including the delta of the "Fly" river, whose channels were ascended for several miles. The interesting narrative of the surveying voyage of the *Fly* was written by the naturalist, Mr. Jukes, and published in 1847; and another book was published by Mr. Macgillivray, Lord Derby's collector, in the *Rattlesnake*, in 1852.

Lieutenant Yule, in the *Bramble*, continued the survey from the head of the Gulf of Papua to Cape Possession, including Yule Island and Redscar Bay; and he took formal possession for the British crown. Captain Owen Stanley, in the *Rattlesnake*, completed the examination of the Louisiade Archipelago and the south-east end of New Guinea in 1849. The most remarkable feature on this coast was a high range of mountains seen at a distance, extending for nearly 200 miles to Redscar Point. Some of the peaks are 10,000, and Mount Owen Stanley itself is 12,800 feet above the level of the sea.

The discovery of the south-eastern extreme of the Owen Stanley Peninsula was completed by Captain (now Admiral) Moresby, in 1873, in H.M.S. *Basilisk*. He, and the able surveyors under his orders, including Lieutenant L. Dawson, found that eastern New Guinea did not end in a long wedge as previously delineated by map-makers, but in a huge fork, the lower prong of which is cut up into an archipelago of islands. Between these islands and the northern prong there is a sheet of water about 45 miles deep and 12 to 18 broad, named by Captain Moresby—Milne Bay. The newly-discovered islands are mostly lofty, volcanic, and richly wooded. The *Basilisk* also fixed the position, and laid down the coast-line of the D'Entrecasteaux group, seen by that navigator at a distance, when in search of La Pérouse in 1793. Still more useful work was the discovery of several new harbours on the New Guinea Coast, such as Port Moresby, on the south-west coast of the peninsula, Robert Hall Sound, 60 miles further to the north-west, and Pitt Bay on Moresby Island, at the gateway of a new Austro-Chinese route. Lastly, the officers of the *Basilisk* carefully examined the northern coast from the East Cape to Astrolabe Bay, and Captain Moresby gave a most interesting account of the Malayan race inhabiting this eastern extremity of New Guinea.

At Astrolabe Bay we come upon the researches of a solitary and most indefatigable traveller, the Russian Miclucho Maklay, who, through the good offices of the Grand Duchess Helen, obtained a free passage on board a Russian frigate in 1870. He was attracted to the Astrolabe Bay of Dumont D'Urville, because there he hoped to study the pure Papuan

race. In September 1871, a hut was built for him on shore, the Russian frigate *Vitäs* fired a salute in his honour, and left him alone. For more than a year nothing was heard of the adventurous student. Then the ship *Tzumoud* was sent from St. Petersburg, and found him sadly altered by illness, and seamed with wounds. He had compiled a vocabulary of 800 Papuan words, and collected much valuable information respecting the people, but was unable to penetrate any distance from his hut. He departed on board the *Tzumoud* in December 1872; but he paid his friends in Astrolabe Bay a second visit some years afterwards.

Signor D'Albertis, who had accompanied Dr. Beccari to the Arfak Mountains, arrived on the coast of south-eastern New Guinea in 1875, and settled for a time on Yule Island, off the entrance of the Robert Hall Sound of Moresby. It is 550 feet in height, fertile, and well cultivated; the opposite mainland consisting of a vast extent of low, swampy ground, backed by range after range of hills, which culminate in the magnificent Owen Stanley Mountains.

In November 1875, D'Albertis joined Mr. Macfarlane of the London Missionary Society, who was about to visit the mouth of the Fly river in the steamer *Ellengowan*. Notwithstanding the hostility of the natives, they succeeded in ascending the river for about 150 miles. Returning to Sydney, the liberality of the Government, and of a few private citizens, enabled D'Albertis to equip another expedition; and in 1876 he ascended the Fly river for a distance of 500 miles. His vessel, the *Neva*, drew 4 feet, and this was the limit of navigation, amidst hills forming the counterscarp of the high central chain called the Charles Louis Mountains, where the Fly river takes its rise. The highest point was reached in June 1876. He made a third ascent of the river in 1877, but did not ascend so far as on the second occasion. Signor D'Albertis attaches great importance to the position of Yule Island, and believes there is a great future in store for it, whenever New Guinea becomes a field for colonisation. He was not, however, favourably impressed with the country through which the Fly river flows. The interminable forests are under water for the best part of the year, and the vast grassy plains are converted into lakes during the rainy season.

But it was Admiral Moresby who gave the great impetus to the exploration of New Guinea, and especially of the Owen Stanley Peninsula, by his discoveries, and the information he collected. The missionaries of the London Society, who began their work in 1871, have secured a footing on the coast, at Port Moresby and other points, and have made some interesting journeys to the foot of the Owen Stanley range. The Rev. W. G. Lawes, who lived at Port Moresby and Hood Bay from 1874 to 1877, has given us some interesting details respecting the country and the people. In 1875, the missionary Mr. M'Farlane with Mr. Octavius Stone, in the *Ellengowan* steamer, discovered the mouth of

the Mai-Kassa, which they called the Baxter river* (142° 18′ E. and 9° 8′ S.), and found it to be two miles wide and 10 fathoms deep. The river was ascended for 91 miles, and a bird was seen flying, which was estimated to measure 16 feet across the wings. The steamer went down stream in nine hours, and the impression received by the explorers was that southern New Guinea, in this part, was intersected by large streams which might easily be explored in a steam launch. The course of the Baxter river does not appear to extend beyond the deltaic region of the "Fly."

Port Moresby, and the neighbouring coast region, having proved unhealthy, the Rev. James Chalmers made a journey in 1879, of ten weeks' duration, into the interior, to explore the country for more suitable localities. He travelled up the west bank of the Laloki or Goldie river, through a well-peopled country, with cultivation and abundant supplies of water. But he was unable to cross the main Owen Stanley range, owing to the height and inaccessibility of the mountains, the thick bush, and huge boulders. Mr. Chalmers describes the country as one mass of forest-covered ridges, with fertile and well-watered valleys between them. The river Laloki, which drains the whole region, falls over the face of a precipice in descending to the low land behind Port Moresby. The height of the fall is about 900 feet. Another river falling into Hood Bay, called the Kemp Welsh, has been ascended for 18 miles by the Rev. Thomas Beswick; and in 1881, Mr. Chalmers and Mr. Beswick explored the Aroa river, flowing through the Kabati district, behind Redscar Bay. In 1882, the two enterprising missionaries, Chalmers and Lawes, accompanied by Mrs. Lawes, undertook another journey into the interior, to visit the Rouna Falls. They ascended the Veriata Mountains, whence a glorious panoramic view was obtained, embracing the valley of the river Laluki. The falls were visited, and the party returned after having spent ten days in the mountains. It appears that Mr. Goldie, the naturalist, had his camp for some months in this district. Captain Armit, the correspondent of the *Melbourne Argus*, has also made a journey to the foot of the mountains.

Our last accounts of New Guinea were from Mr. Wilfred Powell last April, and will be fresh in the memory of Fellows of this Society. He gave us an interesting account of his observations during a cruise along the northern coast; and especially dwelt upon the importance of the river Ambernoli (Amberno) as a route for future discovery. He also alluded to the commercial capabilities of New Guinea, enumerating its more valuable products.

It would certainly appear from the letters of the missionaries at Port Moresby, that they are able to explore the country in all directions, and that even an English lady has ascended mountains and visited falls in the interior. Physical difficulties alone appear to have stopped them.

* After the lady who presented the *Ellengowan* steamer.

We may, therefore, look forward to a complete examination of the peninsula, and of the Owen Stanley range, before very long. The naturalists have also succeeded in ascending the Arfak Mountains in the north-west peninsula. The two extremities of the vast island are beginning to be known in their general features. But the central portion, covering thousands of square miles, is still unexplored and unknown. It offers a wide field of the greatest interest and importance to geographical enterprise.

In thus passing the discoverers and explorers, and their achievements, in rapid review, we obtain a general idea of the way in which the coast-line was slowly and very gradually delineated. There is, I think, some use in such a rapid review of past work, because when names of places are brought before us hereafter, they will become to us something more than mere names. The discoverer, and the occasion of the discovery, are brought to our memories, and thus a more intelligent interest is attached to future narratives. It is with this intention that the present paper has been prepared; and I trust that it may have, at least in part, secured its object, in spite of numerous deficiencies and imperfections.

The following discussion ensued on the termination of the reading of the foregoing paper:—

Admiral Moresby said that although it lessened the credit which he had thought belonged to himself, he was glad to hear that to an older and better navigator the honour was due of having discovered Milne Bay. But whilst that was the case, he was also glad to think that the ship's company and the officers of the *Basilisk*, and the old ship herself, had still the unique claim of being the first to pass between the Louisiade Archipelago and round the eastern end of New Guinea, so opening up what he was firmly convinced would be the future passage from Australia to China and Japan. It was this conviction that made him take the responsibility upon himself of the voyage in which he discovered the passage. The passage had not yet been generally made use of, but, although the sea on the north-eastern coast of New Guinea was said to be studded with reefs, he felt quite certain that when it was surveyed it would be found to possess not only one, but numerous channels through which vessels could pass, and thus diminish the voyage from Australia to China and Japan by some 300 to 400 miles. Objections to that route had been made on the ground that the trade winds did not blow there—that it was a region of calms and baffling winds as well as of coral reefs; but steamers had now taken the place of the old sailing vessels, and if the *Basilisk* could pass by a clear channel through this coral-sprinkled sea, making her own charts as she went, it is contrary to a seaman's common sense to argue that the passage when surveyed would not be a perfectly safe one. The *Basilisk* was the first vessel to explore the north-eastern coast of New Guinea. It afforded him great pleasure and pride to be able to write the names of Nelson, Trafalgar, Collingwood, Gladstone, and Disraeli, on that north-eastern coast. He called two mountains which faced one another by the names of Gladstone and Disraeli. When he asked Mr. Gladstone's permission to give his name to the mountain, which was about 9000 feet high, Mr. Gladstone declared himself unworthy of the honour, but permitted it; but Mr. Disraeli bantered him very much, and expressed a hope that he should agree better with his rival in New

Guinea than on the floor of the House of Commons. He could fully bear out what Mr. Markham had said about the general friendliness of the natives, and therefore he thought that Mr. Powell, who was about to undertake the exploration of the central part of New Guinea, would be able to accomplish his task successfully, without loss of life or bloodshed. That view of the case was borne out by what Baron Mackley, the Russian traveller, had told him. Baron Mackley seemed to think that with proper consideration and proper nerve and presence of mind, and treating the New Guinea natives with firmness, and at the same time with kindness, almost anything could be done with them. He (Admiral Moresby) believed that that was true with regard to the east coast, though it might not be true further to the westward. No one could doubt that the future of New Guinea was a great one, and he was glad to hear that Mr. Markham, who must have a great deal more knowledge on the matter than he himself, had spoken so emphatically of the island being virtually a part of the British Empire. He trusted that it would soon be not only virtually, but *de facto*, part and parcel of Her Majesty's dominions.

Sir J. Thos. M'Ilwraith (late Prime Minister of Queensland) said he could not add anything to the geographical information which had been given by Mr. Markham, but he cordially agreed with that gentleman in congratulating the Society that New Guinea was now virtually annexed to the British Empire. He himself had done what he could to bring that question into the field of practical politics, and when he left Australia it was in such a position that the statesmen of England and of the Colony must find a remedy for the present condition of affairs. That the island would ultimately be annexed he had not the slightest doubt. Queensland had suffered much more than was generally known in England from the French convicts that were continually landing there. At one time it was very probable that New Guinea would fall into the hands of the French, but the action of Queensland had prevented the convict question coming so close home. It had been said that the Empire could not be rounded off so as to avoid having neighbours, but there were neighbours and neighbours, and the Colonists would welcome the Dutch as good neighbours, for that nation had made good use of Java and all their Eastern possessions, and were able to teach English colonists a great many lessons which they would be very glad to learn. The greatest advantage, however, that had arisen from the raising of the question of the annexation of New Guinea, was the impetus it had given to Colonial federation. He did not mean simply the union of three or four colonies so as to perform the work of government more easily among themselves, but that confederation which would ultimately have the effect of uniting the Colonies and England in one empire. Colonists perceived a coldness in a great many British statesmen with regard to the position which the Colonies hold. He himself was now a Queenslander, but he reckoned himself as good a Briton as he was when only a Scotchman. He wished always to remain connected with the Empire, and there was nothing that annoyed colonists so much as the prospect, constantly hinted at by a party in this country, of their being at some time or other separated from the Empire. Federation among the Colonies was the first step towards the confederation of the Empire. On that account he looked back with pride on the action that Queensland had taken. It did not spring from a paltry desire to get more land, for they already had 400,000,000 acres with a population of only 300,000; nor from a wish to get niggers to work in the sugar plantations, because they knew that the natives of New Guinea were not fitted for that work, but simply for the purpose of preventing bad neighbours coming near them, and in order to become part and parcel of the British Empire.

Mr. Coutts Trotter said that we hardly realised how little was known of New Guinea from a geographical point of view. The best known, i. e. the north-

western portion, had been penetrated only 20 miles inland though the peninsula was 200 miles across, so that even the interesting discoveries of the naturalists there are an insufficient basis for general deduction. Dr. Meyer's mention of a lake was very curious, as only lagoons had been previously known. He had no doubt that the dwellers on its shores built their houses on piles as the old lake dwellers did. But Dr. Meyer's native companions were very satirical and witty about the very scanty costume worn by the people there, and considering what the ordinary Papuan dress was, that which they laughed at must be very scanty indeed. He entirely agreed with Mr. Markham as to the spirit in which the Dutch claims should be treated. At the same time, discussing the matter purely in an academical sense, he thought that those claims had no validity at all. Their first claim was on the south coast from the 141st meridian to the north-western corner of the island. That was a genuine annexation, but in 1848 the rescript of the Governor-General declared that the rights of the Sultan of Tidore extended to the 141st meridian on the north coast. That, however, was a mistake, because the natives there utterly repudiated his suzerainty. The line drawn across the map from north to south was far too scientific a frontier to have been drawn by the Sultan of Tidore. By our treaty with the Dutch in 1824, the two nations bound themselves to inform each other of any annexation that took place in the Archipelago, but as far as he knew the Dutch had never notified any such annexation to us. Theoretically, therefore, the annexation by the Dutch had no validity, and he did not think it was ever intended as an annexation. The idea, no doubt, was to put in a provisional caveat, so that if their resources were equal to it they might develop those coasts, but he did not think their resources were now sufficient for the task. The claim of the Sultan of Tidore extended over "all Papua," which meant the countries inhabited by black, frizzly-haired people. These extended as far east as Fiji, and he supposed that neither the Sultan of Tidore nor the Dutch laid any claim to that group of islands.

Sir Rawson Rawson said that New Guinea consisted of two parts, the smaller one separated from the other by a narrow isthmus. The whole covered 300,000 square miles, while Australia covered about 2,100,000 square miles. The north-western peninsula was about one-seventh of the whole of New Guinea, and the fact was that the Sultan of Tidore, upon whose rights Holland founded its claim, never had any authority, and was scarcely known, east of Geelvink Bay. When in 1828 the Dutch claimed westward from the 141st meridian, they did not do so as the suzerain of Tidore, but took possession of it in the name of the Netherlands Government, actually accepting four small districts upon the ground that they were claimed by the Sultan of Tidore. It was not until 1848 that they claimed any part of northern New Guinea as suzerains of Tidore. In 1858 a Dutch man-of-war went to Humboldt Bay and laid a foundation for the claim of Holland to that coast, but at that time, although the captain of the ship had a prince of Tidore on board, the natives knew nothing of the Sultan, and did not recognise any authority as resting in him. Mr. Markham had stated that the British Government had to a certain extent acknowledged the claims of Holland by adopting the 141st meridian as the limit of the district within which it exercised some authority, but the limit was the 143rd meridian, and the Government probably adopted that meridian in 1877 on account of the southern coast having been surveyed by British ships of war as far westward as 142½°. Mr. Markham had expressed sympathy with the Dutch Government in regard to its claims, but he (Sir Rawson Rawson) could not approve of their commercial or their political policy in the East. As long as Holland could keep the monopoly of the Spice Islands it did so, but when it was obliged to surrender it, its claims were extended eastward to New Guinea, to shelter and protect (as its own

writers said) the Spice Islands against competition. Meinsma, when giving an account of the possessions of Holland in the Eastern Archipelago, distinctly stated that in 1828 they claimed a part of New Guinea for that purpose; while Temminck stated that they did so as a counterbalance to English influence in that part of the world. Windsor Earl also, in his introduction to the translation of Kolff's Voyage in 1825, said that the Dutch sent a ship to the east coast because England had formed a settlement in Melville Island and had begun to establish an influence in Australia. Holland, however, had not planted a single colony in New Guinea, and was not likely to do so. He therefore had no sympathy with the Dutch policy in the East.

Mr. WILFRED POWELL considered that the Amberno must be an immense river, because the *Challenger* when off the coast found that the water was brackish at a distance of 60 miles from the island, and the drift-wood and mud from the river were found still further out. He regarded the Fly river as the great water route to the interior from the south, and the Amberno from the north. The heights of the Charles Louis range, as set down on the Admiralty chart, must be only conjectural, because no one had as yet been there to ascertain whether they were 16,000 feet or not. The range undoubtedly formed a backbone to the island, and branched off at either end. Admiral Moresby had made a remark with regard to a new route to China, and he (Mr. Powell) knew for certain that there was a deep-water channel from China Straits the whole distance along the coast of New Guinea. The Lusancay group of islands formed a lagoon, but there was deep water between them and the shore of New Guinea up to Dampier Straits. He hoped to be able to traverse the Amberno river to the Charles Louis Mountains, because there the fauna and flora of Asia and Australia divided, and it was impossible to say what might be found there. The flora of the Alps, or even Snowdon, might possibly be met with there. New Guinea was the home of the tree kangaroo and the bird of paradise, and it might be of other strange things that had not yet been discovered. Valuable information might also be obtained about the geological formation. Buildings had been discovered on the island of Paanopa far away to the eastward, and Sir Frederick Evans had received a copy of them. They were most wonderful remains, extending over an area of five miles, and it was quite possible that similar buildings might be found in New Guinea.

The CHAIRMAN, in proposing a vote of thanks to Mr. Markham, said it was quite clear that before long our knowledge of New Guinea would be greatly increased, and he was quite prepared to find the island grow in importance, both nationally and commercially, within a very short period.

# THE EARLY DISCOVERERS OF NEW GUINEA.

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# REPORTS

ON

# PARTS OF THE GHILZI COUNTRY,

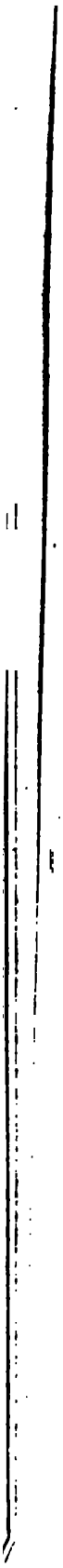
## AND ON SOME OF THE TRIBES IN THE NEIGHBOURHOOD OF GHAZNI;

AND ON THE

## ROUTE FROM GHAZNI TO DERA ISMAIL KHAN BY THE GHWALARI PASS.

By Lieut. JAMES SUTHERLAND BROADFOOT,
Bengal Engineers, 1839.

Edited by Major WILLIAM BROADFOOT, R.E.



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By Lieut. James Sutherland Broadfoot, Bengal Engineers, 1839.

Edited by Major William Broadfoot, R.E.

Map, p. 438.

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### Introductory Note by the Editor.

These reports having recently come into my possession, I was struck on reading them with their interest, geographically; no description of these parts of the country, except a somewhat short account of the route described in Report II. by Mr. G. T. Vigne, having been published.

As Lieut. Broadfoot's reports had always been considered confidential, I applied for sanction to present them to the Royal Geographical Society, which was accorded by the Secretary of State.

As I had Lieut. Broadfoot's original journal, I have in places added to, and corrected or eliminated parts of the reports as printed in Calcutta in 1870.

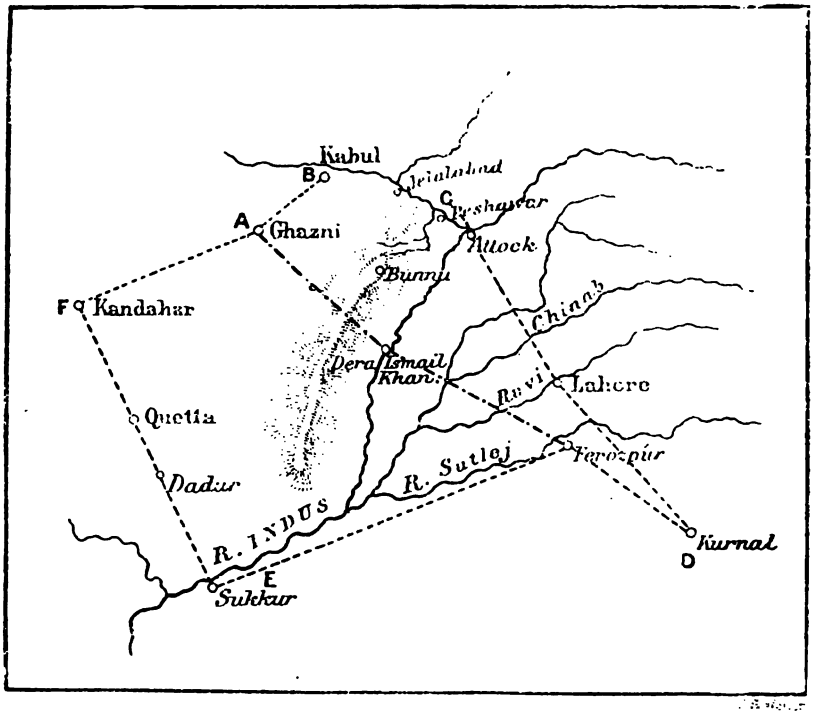
With respect to the spelling of the names of people and places, I have generally followed the mode adopted in Sir Charles Macgregor's compilation or Gazetteer of Central Asia, except where I have had reason to think that the transliteration was incorrect, or not intelligible to ordinary English readers. I make no pretence to accuracy in the matter of spelling Afghan names, and will be more than satisfied if I can make them generally intelligible.

Lieut. Broadfoot accompanied the army from Firozpur, across the Indus at Sukkur, to Kandahar and Ghazni. He was engaged with the other Engineer officers in blowing in the gate, and took his part in the storm and capture. He was then left in Ghazni to repair and strengthen the place, and this he describes as six weeks' hard work.

From Ghazni he was sent to join Captain Outram's force against the Ghilzis and other refractory Afghans in the neighbourhood. He remained with this force whilst it was in the field, and marched 340 miles in a month, surveying the country, assisting at the occasional fights, and collecting information regarding the tribes of that unknown country. This information is given in Report I.

When this expedition was over, Lieut. Broadfoot was allowed to explore the route described in Report II. From his journal I extract the following:—"The proposal to explore this pass had been started, I heard at Kabul, by Outram, whom the Commander-in-chief would not allow to go. Outram assisted me by asking Sir

W. Macnaughten's permission; and Major Maclaren allowed me to go in anticipation of sanction." In a letter home, written just after the journey was accomplished, he says, "Between Afghanistan and India runs the great Suliman range of mountains from C to E. Kurnal, whence the army started, is D; the army had marched round by the line D E F to Ghazni at A, nearly 800 miles out of the straight line; it




returned by A B C D, 300 miles round about. The straight line A D from Ghazni to India lies through an unexplored country, of which the mountains were stated to be so high, and the people so wild, that nothing was known of the route. It was much desired that the road should be surveyed, but the attempt was considered dangerous. I made agreements with natives, put on their dress and went among a set of murderers unharmed, because a guest, although 100 of the men of my party were killed one night."

Lieut. Broadfoot was travelling with a caravan of merchants, he goes on to say "the beard and dress quite led them to think me a good Mohammedan, and no Englishman. For twenty days I passed through a range of stupendous mountains without a house, a dog, a crow, or any sign of life, but the nightly plunderers who waited to surprise the caravan. At last I came into the plains of the Panjab and crossed them as an Afghan flying before the English. The people of the Panjab, lately our firm allies, are now bitter enemies; and as an Englishman I should have been insulted, if not stripped and killed. Though there are no mountains, yet I passed five rivers, larger than the Thames six or sevenfold; and 100 miles of desert. At last I reached Lahore, a magnificent looking town, and in three days was in Firozpur on the Sutlej, exactly one year (29th November, 1839) from the day when I entered it proceeding with the army, and where I saw the interview with Ranjit

Singh, now dead. Then I was all expectation and hope, now I came back weary with fatigue, after seeing the most curious race of robbers and murderers, and perhaps the wildest countries in Asia. I went into the first house I found, and met an old friend of William's,* and had my beard cut off, and ate with a knife and fork, and sat on a chair in an English dress."

Lieut. Broadfoot then went to Kurnal, where he wrote the report and drew out the plans. They were submitted to Lord Auckland, who was pleased to express great satisfaction with them, and who permitted Lieut. Broadfoot, at his special request, to return to Afghanistan. He was killed at Parwandarah on the 2nd November, 1840, when the Native Cavalry refused to charge, and allowed their officers, accompanied by Dr. Lord and Lieut. Broadfoot, to charge the Afghan cavalry alone. Of the five officers who charged three were killed, and the other two desperately wounded.

With this introduction I beg to present Reports I. and II. to the President and Members of the Royal Geographical Society.

WILLIAM BROADFOOT, Major.

112, GLOUCESTER TERRACE, HYDE PARK, W.,
31*st May*, 1884.

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## REPORT I.

### *On Parts of the Ghilzi † Country, and on some of the Tribes in the Neighbourhood of Ghazni.*

THIS report was made under the following circumstances:—

Accompanying the army of the Indus from its formation at Kurnal to its march from Ghazni, I had seized every opportunity of examining the people and country. In command of the pioneers, among whom were men of all tribes, I had many facilities for doing so; as Garrison Engineer of Ghazni, I employed every spare moment in surveying the surrounding country, in visiting the Hazara Passes, and in procuring data for the statistics of the district. In two months I was withdrawn to act as field engineer to the expedition against the Ghilzis; as far as my field duties allowed I surveyed the marches; on the breaking up of the force I got permission to cross the Suliman Mountains, and surveyed the country from Ghazni to the Indus.

My only instrument was a prismatic compass, with which I took the angles. Three steady men counted their paces, which, compared with the rates of horses and camels, gave the distances pretty accurately. While with Captain Outram I used his perambulator from Kolalgu to Killa-i-Shahabudin. With the route thus laid down as a base, frequent bearings were taken to the peaks and extremities of hills, and by these the ranges were fixed. Forts near the road were determined in the usual manner, but when seen from a distance of several miles, by only one angle, and the distance estimated by the eye; it being impossible

* His brother, Lieut. William Broadfoot of the Bengal European Regiment.—ED.

† Or Ghilji.—ED.

to recognise them after going a sufficient distance to allow a different bearing. Even these, it is hoped, will afford useful military information. Such a rapid survey must have some errors, and be meagre in details; for this I can only apologise, that it was made at my own expense, without any assistance, endeavouring to supply by labour the place of instruments, funds, and surveying establishment. But the errors are not considerable, as is shown by the nearness with which my surveyed place of Dera Ismail Khan agrees with that determined astronomically. During the Ghilzi campaign, I lost by frost and plunderers the whole of my camels, and with them my Ghazni field-books, on which much labour had been bestowed. The remains of my papers are embodied in the plans and reports. I shall treat of:—1st. Hazaras and Wardaks. 2nd. Table-land of Ghazni and the Ghilzis. 3rd. The Ghwalari Pass.

The triangular space between Herat, Kandahar, and Ghazni is closely filled with mountains, inhabited on the west by Aimaks, and on the east by Hazaras.

From Ghazni three distinct ranges are perceived, running north-east in one unbroken chain. The highest peak is Gulkoh, in the clefts of which snow lies the whole year. Within 16 miles of the city are six passes, all leading into the valley of the Rod-i-Ghazni; their names are Kakrak, Turgan, Gulbari, Roba, Barakat, and Markul. Being alike in character and appearance, a description of Gulbari will serve for all. It is a ravine, at first 800 yards wide, enclosed by rugged hills. The bottom of good soil scattered with fallen rocks; little rivulets run through its whole length and water the land of nine forts. After 6 miles of gentle ascent, it narrows to 30 yards, water and cultivation cease, and a short steep slope leads to the top of the first range. The view now embraces large barren rocks, with a few green specks in the narrow ravines, and the high mountain of Karesuf* bounds the view. I never saw anything wilder or more desolate. A steep footpath now descends the face of the hill, and ends in the valley of Jarmatū, a ravine between barren hills with a few yards of soil at the bottom; rivulets are frequent, and the scanty soil is cut into terraces like those of the Himalayan villages. Barley and wheat, a little tobacco, clover, and turnips, are cultivated. The corn sown in autumn is reaped next August. The winter is most severe; frost continuing in the shade from September to April, and snow from December to the middle of March. The Hazaras are of middle size, but stoutly made; small grey eyes, high cheek-bones, and the want of a beard, show a Tartar origin. The severe climate and barren country increase the harshness of their aspect. Their clothes, made by themselves, are of coarse haircloth; their boots rough goat-skin, and their girdle a rope. They live in little towers containing five or six families, supported by scanty cultivation and flocks of sheep. In autumn, at Ghazni, they exchange furs and haircloth for grain and flour; sometimes Shiah mullahs teach the boys to

* Probably the contraction of Karya Yusuf; see p. 345.—Ed.

read the Koran, but their language is much corrupted from the Persian. Their ignorance corresponds with their poverty. My Hazara labourers were a light-hearted, careless set. They worked well, but were so fickle that, as soon as they got a rupee, they stopped work till the pressure of hunger brought them back.

The women are not always veiled; they have often blue eyes; a few, auburn hair and red cheeks. They are generally ugly, but not very chaste. However, the custom called "Korubistan," by which the Hazaras are said to lend their wives to a guest, in the parts I visited, is certainly a fabrication. They all denied it with indignation, as an invention of the Afghans; yet it is related on good authority. Across Jarmatū is another valley of similar character, and then the precipitous barren ridge of Karya Yusuf (Joseph's rock), which runs from Sir-i-ab to the Wardak country, and is passable for horsemen at each extremity. Beyond is the mountainous district of Aludani, and to the west the district of Nāwar.* This is a plain inhabited by the Muhammad Khwājas, and said to be 20 miles in extent, without trees, but well cultivated. Water being found within a foot or two of the surface, it is perhaps the bed of an ancient mountain lake. The grasses are so abundant, that it has always been a favourite place for the royal stud.

Still more to the north is Besūd, or Besut, the capital of a Polādeh Sultan; the chief is said to possess a town of a few hundred houses, and to keep up 300 horse, though he could raise many more. The want of artificers induces some to travel from Ghazni. They spoke well of the Sultan, praising his justice and liberality. These wandering artisans might give valuable information, but it is rendered worthless by the desire, so natural in a traveller, to exalt the country he alone has seen. They spoke of shawls, gold, and silver in Besūd, where I could find no traces of weights and measures.

The chief has retained his independence, though sometimes attacked by the Afghans, who possess the district extending from Gulkoh to Nāwar, and from thence to the Band-i-Sultan. In Karabagh the Hazaras and Afghans are mixed, in Nāwar and Sir-i-ab is the tribe of Muhammad Khwaja, in Jolga and Jarmatū are tribes of Jaghoris. In the valleys of Sokhta they are mixed with the Wardaks. The cultivated passes of the first range are given to a few families of Persian Bakhtiyaris, known by the name of Kazzilbashes. Nadir Shah settled them in Kabul, and the Afghans employ but distrust them. The young chiefs treated me very hospitably, and seemed to be liked by their ryots. The chief of the whole Hazara district is Gulistan Khan of Karabagh, who is answerable for the tribute. He bears a good character, and joined the King near Ghazni. The rule of the Afghans is merely nominal. The Kazzilbashes and Hazaras used to fight without inter-

* So spelt in Lieut. Broadfoot's MS. Should possibly be Nawāb, which means a plain, or tract.—Ed.

ruption. A revenue of a few thousand sheep and a little money is claimed by the Governor of Ghazni, and generally paid by Karabagh and the nearest valleys. The Hazaras hate the Afghans, who oppress them, and who are Sunnis. Nāwar and Sir-i-ab, a few years ago, refused the tribute, and collected a formidable body of men.

A son of Dost Muhammad at the head of some horse, contrived to drag a light gun through the passes. The very sight of this dissolved the confederacy, and the tribute was paid. In spite of this example, I consider the country west of the first range to be quite impassable for artillery; and even were they dragged along by ropes, in such a country they would be immovable and useless. If a force is required, it should consist of infantry, and a few cavalry, with scaling ladders and bags of powder for the forts. All baggage must be left behind, and grain and ammunition carried on mules or ponies. Provided with a month's supply, 3000 men could then penetrate where they pleased and find no serious opposition. In the valleys, grass, water, and a few sheep could be obtained: in Nāwar some grain might be got, nothing more could be furnished.

The Wardaks inhabit the valley of Sokhta, that of the Ghazni river, and that west of the Logar. They are neither Ghilzis nor Duranis, but nearer in descent to the latter. I have heard them called Sheikhs. I found them quiet and hospitable; the country well cultivated; always melons, and sometimes grapes. Sokhta, so called from its burned-up look, gives them several fine veins of lead, the ore being evidently very pure, from the ease with which it is worked. Small quantities of iron have been found; a shrub on the hills, in appearance like a fern, bears a medicinal gum smelling of turpentine; the specimens I had were lost with my camels. The Wardaks seldom molest travellers or interfere with the Afghan squabbles. Dost Muhammad, unable to make them join him, extorted a considerable sum to pay his troops. From Ghazni, along the river to the Band-i-Sultan, and thence through the Wardak valleys, a road goes over the Gardan to Kabul; it is sometimes travelled, as it avoids the Tang-i-Sher defile, but would be difficult for guns.

In the maps the Ghazni river is represented as a branch of the Logar running to the north. This is not correct, the Logar rises somewhere near Besūd, but the river of Ghazni was made by Mahmud, as follows:— In a little valley 12 miles from the city, three rivulets meet; anciently they flowed through different channels, fertilised a few fields, and were lost; Mahmud dammed up all but one outlet and thus made the present river. It issues from here a stream in the dry season 20 feet wide, 2 feet deep, with a velocity of 5 feet per second. In spring it is much larger; the Band-i-Sultan,* by which this is effected, is a wall of masonry closing a rocky valley; the dam when complete must have been 300 yards long, its height varying from 20 feet to 8 feet, and its thickness

* This dam is described by Mr. Vigne, but not in so great detail as here.—Ed.

6 or 7 feet. In autumn, when the ploughing is over and water no longer wanted, the outlet is shut (and a lake fills the valley 600 yards wide with a greatest depth of about 30 feet). In spring when cultivation begins, the orifice (a mere hole in a rock, stuffed with brushwood and earth) is opened, and the stream rushes out in several cascades, thus giving the whole water of the year in the season it is required. The lasting benefits of this work atone in part for Mahmud's religious cruelties. The principal of the rivulets which feed it rises on the northern slope of Sir-i-ab, and running to the north for 20 miles through a narrow valley, turns to the right by Sokhta in the direction of the dam. In its course to Ghazni, for the first four miles the river is confined by limestone rocks, opening occasionally, enough for a fort and a patch of corn; after this it sends off numerous irrigation canals to a line of villages on each of its banks. On the west are the bare spurs of the Hazara Mountains, and to the east a still barer tract thinly sprinkled with camel shrubs, and sloping up to the defile of Tang-i-Sher.

### Ghazni and the Ghilzi Country.

The country from Mūkkūr to Ghazni may be considered a sort of table-land, bounded on the north-west by the Hazara Mountains and on the east by the Jadrān range. Six miles north of Ghazni the plain attains its greatest elevation and declines towards Kabul. South of Mūkkūr it sinks rapidly into the valley of the Tarnak. Between the two great ranges a low chain of hills conducts the drainage from both sides into the Ab-i-Istadah Lake. Elevated from 7000 to 8000 feet above the sea, the climate is severe. It freezes every evening in October, and the ice lasts till midday; in November it never thaws; in December the country is covered with three feet of snow, which melts in the middle of March. The people then issue from their long confinement, and find the fields green with corn, and the plain covered with flowers which last only a few days. The climate is then genial, but even in July the heat is not oppressive. Except the periodical snow, rain seldom falls. This has retarded the decomposition of the rocks and the formation of soil; but the time may confidently be predicted, when much of the limestone, slate, and trap, shall have crumbled to powder, and the barren plains turned into forest or meadows.

These ideas are confirmed by the fact that the Jadrān range, whose height and situation intercept much of the moisture destined for the plains, thus contributing to the dryness of their climate, is well covered with soil and sprinkled with trees; while hills of the same formation, but placed in its lee, have scarcely soil enough for shrubs a foot high. The rocks here splinter by frost, not crumble by rain; their general appearance is a precipitous crest, with a base of angular débris, at first waving in hillocks, and then sinking in a long gentle slope to the plain.

These slopes are scattered with a thin, low, camel shrub called "Tirkba," and have many subterranean springs. By some strange method the Afghans discovered where the springs were situated, and digging down to them formed wells: but wells are emptied by mechanical labour, and the Afghans by great labour have dug subterranean galleries from the springs to the valley lower down; these galleries having a small slope, the water pours through them, and the wells thus emptying themselves are called Karez.* Where the water issues from the ground is a fort with a few acres of corn and lucerne.

The general landscape is a brown stony moor bounded by distant hills, whose black rocky tops and shelving sides I have already noticed; sometimes a diminutive fort and its patch of cultivation look like green specks in the large waste; sometimes forty or fifty are in view at once, but they never hide the naked plain, and the general aspect is one of desolation. At Ghazni I observed that the wind during the day was constantly from the south. It may perhaps be accounted for by the fact that the trade winds tending to accumulate at the equator all the air of the globe, an upper current towards the poles is absolutely necessary. The altitude of Ghazni may bring it into these currents. At Mussoorie there is a great preponderance of the south or Doon breeze; but the theory requires more confirmation.

The Jadrān range runs N.N.E. It is the chief of the Suliman chain. I saw it in the distance overhanging Gardez and joining the Michelga hills, the last spurs of the Safed Koh. It is named after the wild Jadrāns, who occupy its eastern slopes. To the south it is penetrated by the difficult Pass of Paltu, and continued under various names to Konak and Sargo; from thence passing the lake it goes south, skirting the Tokhi and Hotaki country, and apparently ends near Quetta. All the streams of its eastern slope force their way to the Indus, showing that no intermediate range is so high or continuous; indeed, standing on ground 3000 feet above the sea, it may fairly be presumed as higher than the Takht-i-Suliman; a rough method made it 4000 feet above the plain. It throws out branches which shelter the Turis, Jajis, and other hill tribes, and direct the streams of Kuram, Kundar, and Gomal. I am at present uncertain whether the Waziri hills are a range running between the Throne of Solomon and the Jadrān Mountains, or are the spurs and offsets of the latter; another journey would settle the point. From Gardez to where I passed it in Sargo, this range is tolerably wooded; its peak and eastern face are covered with pines, and its lower parts with trees, whose Pashtu names I can give, but not a botanical description. The "Shne" has an eatable berry; the "Zrilg" an excellent gum, sometimes exported to Multan; the "Kurye" is much praised as a remedy for wounds; the "Khang"† furnishes wood

* Kārez, a Persian word meaning canal or channel.—Ed.

† "Pustuna" of Mr. Vigne.—Ed.

for bows; the "Adzarna" gives out a pungent oil; but the "Manzeh" pine, whose fruit is the chilgoza, is the most important, as whole tribes live on the nut, which is like an almond tainted with tar. The principal rock is clay slate, dipping 45° to the east. Parallel to this great mountain is the Hazarnow or Gharikoh, a ridge about 2500 feet above the plain, bare and rugged in its aspect.

Ala-koh is the peak of a mountain similar to the Hazarnow, on which it abuts to the east, running westward to Ghazni and crossed by the Kabul road at the defile of Tang-i-Sher. On a low spur of it, the Koh-i-Takht, some thousand Ghilzis were put to flight the day before we took Ghazni.

Between the last two ranges is Kharwar, an elevated barren district, thinly inhabited by Anders and Sohaks. To the north Kharwar opens on the fertile valley of Logar; to the west it commands the Kabul road; to the east it is entered from the Drang Pass from Zūrmūl; and on the south by the Robat Pass from Shilgar. The Zintig Pass is between the two. Of these I understand the Drang is the best, being passable for camels. The central situation of Kharwar makes it a favourite haunt of robbers, as they have on all sides a sure retreat. The country is dry and poor, guns could not easily cross it, and troops would find little forage. Takri is a rocky ridge about 1000 feet above the plain; it is 18 miles long, steep in the centre, but easily passed at either end. The range continues with intervals through Spinsak and Jarak-kana, the hills being of precisely the same character, and then may be traced in the rocky isolated peaks of Nanai Ghund, Zizhgai, Khwaja Hilal, and Do Kui. On the western base of Jarak-kana is a lower ridge, evidently of contemporary origin; and on its eastern side a chain of rounded hillocks formed of its débris, and called in the north Kharbin, in the south Gazdara. This is continued on a larger scale in Zhera, a rocky peak, surrounded by miles of hillocks and finally sinking into the Ab-i-Istadah Lake. Girdanai is the last of a range running from near Kandahar along the south-east bank of the Tarnak; it has, as usual, a rocky top and base of hillocks, with a pass every five or six miles. Before it is hid by the high land of Ghazni, its continuation may be traced in the disjoined ridge of Karghana, which has a few peaks of rock rising above a long ascent of moorland.

The river of Ghazni has been traced to the city. It passes between Shilgar and Nani, sending off many irrigation cuts, till the water, after ten or twelve miles, becomes much less, and its banks too steep. It next runs west of Pannāh and Khwaja Hilal between Do Kui and Ab-band; in this desolate tract it is strongly impregnated with salt, and falls into the Ab-i-Istadah Lake. A curious circumstance occurs: the fish, brought by the stream from the upper parts, on entering the salt part sicken and die; they may be taken by the hand in all stages of illness.

The next feeder of the lake is the Jilga or Surkhrud, which, rising

in Gardez and Michelga, flows through the whole of Zūrmūl, and passing through Sardih joins the Ghazni river opposite Moshaki. At Sardih it has perpendicular banks 15 feet deep, cut into hard clay; the stream was 1 foot deep and 20 feet wide; in spring it is barely fordable. In the lower part of its course it is not used for irrigation. A third stream is the Paltu, which rises in the pass of that name, and runs through Kattawaz to the lake; in its course it becomes slightly brackish; its banks are never above four feet high, its dimensions those of the Jilga. A very small stream runs into the lake from the Turkani Nawah, a few miles of which it drains.

The Afghans insisted that the water runs out of the lake through this stream; they must have been trying to deceive me, as the stream would run further to the south or else form a new lake, and also such a drain would prevent the lake rising in its level during spring, the proofs of which are very evident in the newly dried banks of clay all round its channel. As we passed the greatest part of the Ab-i-Istadah by night, I cannot answer for its exact figure, but am not far wrong in estimating it at 17 miles broad and 15 long; its depth, I understand, is very trifling, probably not above 12 feet in the centre; it is bounded by a gently shelving margin of naked clay; not a tree is in sight, or a blade of grass, and hardly a fort; the blue hills in the distance make it look more lonely still. There were several large flights of chikor and rock pigeon, but we looked in vain for the myriads of water-fowl which the Emperor Baber declares give its blue waters a red appearance; the only instance I have detected of oriental exaggeration in his book. Its waters are as salt as brine: I think, with soda, but had no tests.

Shilgar is included between the Ala-koh and Takri ranges and the river of Ghazni. The population are Anders, with the exception of the Tajik villages, Rakmak and Robat, each of about 150 houses. It contains about 340 square miles, and I estimate its population at 20,000. The western part, well cultivated with wheat, barley, lucerne, and clover, partly supplies Ghazni; the country is flat and easily passed in all directions; water is abundant, and troops would be well supplied. These estimates of population were made from lists of the number of the forts and water-mills as given by the Afghans, and are to be looked on as mere approximations. Zūrmūl is a valley 40 miles long and 20 broad; in its northern part is the Tajik village of Gardez, numbering perhaps 250 houses. Between that place and Kolalgu the inhabitants are Ahmedzais and Ali Khels. The mountains on each side furnish many karezes, and occasionally a line of forts parallel to their bases; a third line follows for some miles the course of the river, by which its fields are watered; Kolalgu is a Tajik village of 200 houses. From thence the western line of forts as far as Sardeh belongs to the Anders, and the eastern, which is more numerous, to the Suliman Khels. The roots or spurs of the Jadrān Mountains shelter a few hundred families of wandering

shepherds and robbers; the population is about 40,000. From Gardez a good road goes by Logar to Kabul and a more difficult one by Michelga to Jalalabad; the valley is passable for artillery in all directions; water, forage, and grain abundant. The road from Ghazni to Kolalgu is very easy as far as Killa Daulat Khan, from thence it crosses two low hills, and winds among some small ravines caused by the water from the east of Shilgar falling into Zūrmūl. These would give a little work to the pioneers, but I think they might be avoided by keeping to the north of my route. The wide space marked Darra is a plain inhabited by Sohāks, and the entrance to the pass of the Kuram river and to the country of the Jajis. The Pass of the Paltu is said to be difficult, and leads among craggy mountains to the Kharoti country and the source of the Dwo* Gomal at Shorkacha: the country is impregnated with salt. Sardih is a narrow strip between the lower end of the Takri and the hill Spinsak. It has seven or eight forts of Anders comprising about 1000 souls. The ground is covered with tamarisk bushes, and cut up by ravines running into the Jilga. Here are the remains of a dam erected by Mahmud, but now commonly ascribed to the prophet Ali; its object was to irrigate the land by means of the Jilga. Opposite Mursal there is an easy pass into Shilgar over the low end of Takri; there are others lower down; a guide can show several easy passages through the ravines.

Melanai and Joga are clusters of forts of Anders included in the Shilgar district. The roads from them to Pannāh are over an easy plain.

Pannāh and Maibolagh are little districts of Anders, together containing about 1000 souls. The road here winds among hillocks, but has no serious difficulty. Supplies for a small force could be obtained at Pannāh. Among the hillocks are camps of shepherds and Lohani merchants who emigrate in winter. Mulla Khel, Alisher Khel, and Zizhgai, are inhabited by Anders and Tarakkis mixed. The country is now even barer than before, and is a series of low swells and hollows; water is found near the forts, but supplies are scarce. At Shinbuti a spring of water issues from a hillock, and is the usual seat of a pastoral khel; at Ashlan there are two forts with twenty families. The ground is now completely void of brushwood, and salt; no supplies could be obtained; the road is easy, and parallel to the Ghazni stream now flowing sluggishly between steep banks. Dila is a fort of Khudazais with a few families, a strip of cultivation, and a well of good water; another fort of the same tribe is nearer the lake. During the night march to Mansur Karez, the shepherds' fires were all we saw. They tantalised us greatly as far as 15 miles—they seemed always close in front. At that place we saw the last of the Tarakkis' five or six forts of the Shibe Khel. From thence we marched among hillocks to Ferozai, the boundary

* The Shei Gumal of Mr. Vigne. The other branch is called Kena; Shei meaning right, and Kena left.—Ed.

of the Tokhis; no supplies except water and camel forage could be procured.

(From this place to Barik Khel * I was constantly occupied by my field duties, and could only take occasional observations; this part must be taken with less confidence, but the Bombay army having passed leisurely along, can correct me where I am wrong.)

For nine miles the road lies among difficult hillocks as far as a spring of water, from thence we got into the Turkani Nawāh † ("Nawāh" is a plain), an open plain, well cultivated by the Tokhis and Hotakis in the south, and the Tarakkis in the north-east.

After passing five forts, we arrived at Killa Abdurahman, the fort of the Khan of the Tokhis; this was a square of 120 yards with a mud wall 6 feet thick and 24 feet high, with large towers at each angle, and in the centre of each face a ditch had been dug and partially filled. Some years before, this fort had successfully resisted all the troops of the king. After blowing up the place we marched 20 miles through a tolerably well-cultivated part of the nawah, or "plain," and passing near the fort of the Khan of the Tarakkis, and a village called Lalezai of the same tribe, we reached Barik Khel. The nawah has on the west, the Rozanai and Sarrim Sokhta or "Sakhtu" hills, dividing it from Sírmagha, inhabited by the Muhammadzai Tokhis, and from the plain of the Tarakkis. These hills are about 1000 feet high, but not very steep. In the last the prolongation of Shinkai divides it from Wazikhwah, a hilly district of the Suliman Khels, and from Alitagh, a fine valley of the Shamalzai-Tokhis. To the south is the Marūf and the valley of the Arghesan.

From Barik Khel to Mir Ghazzab, the beginning of Wazikhwah, is about 20 miles, the road lying among barren hills, but, I believe, passable for guns. Mir Ghazzab has four families and a spring of water. The inhabitants are Nassir Suliman Khels. The chief was usually called the "Mama," because he was both father-in-law and uncle to Kohan Dil Khan. He had a fort with good thick walls, large towers, and a ditch, yet he would not stand an assault, but fled at our approach, taking with him two Mushirs ‡ of his tribe.

Returning from Mansur Karez, we passed an open plain to Killa Arzbegi. The Arzbegi was said to be good and kind, yet every one knew him to be a notorious robber. Gilan, Mūkkur, and Oba are fertile districts, inhabited by Tarakkis and a few Duranis. Water was everywhere abundant, and the road a level plain. Between Mahmud and Rozanai all the forts are ruined except Lalam Piyari Khel and Habibulla. Three miles to the west were many forts, which I pass over, because they have been closely surveyed by Lieutenants Anderson and Durand of the Engineers. From Rozanai to Jamrad are fifteen forts

* Barik in Lieut. Broadfoot's notes: Bara Khel on some of the maps.

† "Nawar" in Macgregor's 'Central Asia'; an error, I presume, for Nawāh, which means a tract or district.—Ed.

‡ Mushir means elder, councillor.—Ed.

with excellent cultivation, the road good, and water and supplies abundant. Karabagh has been previously mentioned; Moshaki and Nani are like Rozanai and Jamrad; Moshaki is inhabited by Anders.

Ghazni has 900 inhabited houses, which, at five to each house, will give a population of 4500 persons. To this may be added 1000 for garrison and camp followers. There are generally about 200 Hazaras, who come to get labour, or to sell their wool and hair cloths: also about 150 Hindu families, the money-lenders and bankers of the place. They are required to wear tight trousers, instead of loose ones, and a black cap for a turban, and to pay a small tax as infidels. For these concessions they receive protection and even consideration, and are allowed to practise their idolatries in secret; their strange dress and dirty habits are very unlike the Hindus of India, but they are still the same quiet, money-making people.

The rest of the inhabitants are Tajiks, as are also the people of the tract bounded on the north by the Wardaks and on the south by Nani, and included between the Ghazni river and Hazara Mountains. The origin of the Tajiks is doubtful, because they are derived from several sources. Those of Kandahar and Girishk, with flowing beards and large black eyes, are probably of Persian descent. At Ghazni, the small and sometimes grey eyes, and the beard generally scanty, indicate a Tartar race, and when we reflect on the dynasty of Mahmud, and the Turks and Moguls established here by Baber, we must expect to find the remains of the powerful tribes which once ruled the country. To this day they are often called Moguls; and the proverb of "Turk and Tajik" is common in Asia. Exclusive of those near Ghazni, the villages of Rakmak,* Robat, Kolalgu, and Gardez, numbering perhaps 4000 souls, have been already mentioned.

Between them and the Afghans exists an enmity, perhaps the effect of ancient wars, and tending much to diminish their numbers. Thirty years ago there were seven forts near Nani surrounded by cultivation and gardens, which were entirely destroyed by the Ghilzis during the troubles ending in the expulsion of Shah Shujah: Nani and Karabaghi escaped with the total destruction of their vineyards and orchards which had been raised by the labour of generations, and have never been attempted to be replaced. The old men told me with regret of the days when every man sat under his own vine. This feud has materially influenced their character. Finding that they cannot oppose force to their enemies, they seldom carry arms, and are inhabitants of cities, because they dare not venture out into the country. Seeing also their land circumscribed by constant encroachment, they have made the most of the remainder by skilful cultivation, making irrigation canals and laborious karezes. In the bazaar they are active, energetic workmen in all the usual trades of the city. They effect by fraud or policy what an Afghan would attempt by open force, and having something of the

* Or Rahmak.—Ed.

Persian wit and politeness, they vent their spleen in a thousand jokes on their Afghan oppressors.

While I was at Ghazni there were several instances of men killed in their fields within view of their walls. This state of things makes the people of the town ignorant of the very hills they see from their citadel; they always spoke of their immediate neighbours, the Anders, as a set of murderous villains instead of the quietest Ghilzis I ever saw. During spring they are constantly occupied in their fields and gardens, a succession of good crops and fine fruit is the result. In May and June the people almost live on mulberries; they even dry them and grind them into flour for winter. Then apricots, peaches, plums, grapes, melons, pears and apples, of good quality, come in by turns. I think that a garden at Ghazni is more useful than a farm, so exceedingly cheap is the fruit; and for six months bread and fruit is their principal food. Towards autumn every one is busy salting long strips of mutton, and in making cheese and kūrūt,* or drying fruit; large stacks of brushwood are collected for firewood, and of lucerne hay for the cattle. These preparations are hardly completed when snow falls and confines every man to his house. They represent this state as miserable, their only amusement sitting in the sun on the top of the house, or crawling to the mosque to hear the news. It may be easily conceived that in a country without glass windows, and where the fuel gives out much smoke and but little heat, the time of frost is unpleasant. To them a coal-mine would be more valuable than diamonds. In March the thaw sends them back to their gardens and fields.

Dost Muhammad formerly protected the Tajiks well, till of late years pressed by the Sikhs he kept up an army larger than his revenues could bear; to effect this he exacted to the utmost from the Tajiks, and the tribes who obeyed him. On the news of the approach of our army the men of Ghazni had to work at the fortifications, and without pay; grain and forage for the country were taken wherever they could be found, and the unhappy owners had to carry them to the store-rooms on their backs; the tribute of three years was levied at once; and the fruit-trees too near the walls were cut down. Enlightened people repelling a national enemy would grumble at such measures; but the Tajiks saw nothing but Dost Muhammad's ambition to keep the throne at their expense; their constant prayer was, "Oh God! make Dost Muhammad poor, for he has ruined us." While the Ghilzis were arming to oppose us, the Tajiks from Nani to Ghazni wished us God speed. They are somewhat unfortunate, however, in their new friends, as about 200 of them were unavoidably killed in the storming, leaving a blank in many a family: at first they grieved bitterly, for their affections are strong; but in a few days they wiped their eyes, came out of their hiding places, thronged the bazaar, and were as merry as ever.

* Kūrūt, dried milk or curd, see note, p. 356.—Ed.

## The Ghilzis.*

The Ghilzis are divided into seven great tribes: the Hotakis and Tokhis living in the district from Marū to the north end of Turkānī-nawah; the Tarakkis from Gilan and Lalezai to Karabagh; the Anders, inhabiting Shilgar, Dihsai, part of Zūrmūl and Pannāh, the Sohaks, in Kharwar, Darra and Paghman, the Ali Khel settled in the north-east of Zūrmūl and the surrounding pastures, and lastly the Suliman Khel possessing half of Zūrmūl, all Kattawaz, Mommai and Wazikhwah, while their shepherds are found from Kattawaz to near Ghwalari; this last tribe is not overrated at even 40,000 families, but the rest may be taken at Mr. Elphinstone's estimate bringing the whole Ghilzi race to about 100,000 houses.

They are first heard of as inhabiting the Suliman range, living more by pasture than agriculture. The Duranis are probably from the Hazara Mountains. In the beginning of the eighteenth century the Ghilzis overran Persia and took the capital; but not enlightened and combined, they could not keep their conquests, and were driven by Nadir, first out of Persia, and then from Kandahar to near their present seats. Ahmed Shah completed what Nadir had begun, and excepting a tumultuous attempt to wrest the crown from Dost Muhammad, they have been pretty quiet though not obedient.

Shahabudin Khan of the Tokhis established twenty-five years ago a kind of rule from Kelat-i-Ghilzi to Kattawaz; he levied taxes on travellers and merchants, and plundered the tribes who opposed him. He is represented as a tall, stout man, kind and hospitable at home, but harsh and oppressive abroad. After his death, his son Abdurahman, in connection with Gul Muhammad Khan of the Hotakis, and heir of the Ghilzi monarch, carried on the same system. The Mama of Wazikhwah timidly joined them; the Khan of the Tarakkis was the quietest and best of the Ghilzi chiefs. The Suliman Khel have no regular head, but Mehtar Musa Khan had influence enough to lead formidable parties to a foray. The Anders and Tarakkis generally submitted to Dost Muhammad and seldom plundered.

The Ghilzis neither dwell in cities nor practise any handicraft trade, but procure their living by agriculture or as shepherds. Their country, without the heat and rains of India, requires more for a harvest than scratching the soil and scattering the seed. Necessity has forced them to make irrigation canals from the rivers, and karezes from every spring. They are rewarded for their toil by good crops and neat farms; unlike the Tajiks, they cultivate no fruit, but occasionally melons; but the wheat for their own food, and barley, lucerne, and clover for the cattle, are of excellent quality. These are grown only for home con-

* Or Ghiljis.—Ed.

sumption; madder is much produced to barter for cloth to the trading tribes.

The fields belong to the head of the family, who with seven or eight houses of relations inhabits a little fort above this cultivation. The fort is an enclosure of 40 or 50 yards square; the mud wall is three feet thick below and one at top; at each angle is a round tower with loop-holes. The houses are generally nine feet high and about 12 feet square, the walls of mud, and the roofs of brushwood hurdles covered with clay. The doors are very small, as wood to make them is scarce. The houses being generally built round the fort, the roofs serve as a rampart from whence a loop-hole fire is brought to bear on the country; the space in the centre serves for cattle, and the towers for storehouses of forage and grain. These forts are intended to keep off enemies without cannon or scaling ladders, and they answer the purpose simply and well. The chiefs already mentioned had thickened their walls to 8 or 10 feet and dug ditches, among Afghans a sure indication that they meant to rebel.

A large proportion of the Suliman Khel and some others are pastoral; they live in rude tents, made of two rough poles supported by hair ropes, on which they hang coarse blankets of their own making. In these the Ahmadzais slowly migrate from near Jalalabad in the winter to Spega and Allāmūr in spring and Zūrmūl in summer, always enjoying a temperate climate; others go parallel to the course of the Gomal as far as Wana and the Prirak. Each family possesses its own flock and a few camels, the tent already described, and two or three cooking pots and wooden bowls, with a few sacks of flour. When several families move and live in concert, they form a "Khel." While the men watch the flocks with arms by their sides, the women make kūrūt* and cheese for winter, butter-milk and bread for the daily consumption. On the march they help to load the camels and pack the tents; they are decently dressed in a brown petticoat and veil, but seldom cover their face unless impudently stared at. Their features are regular but somewhat masculine, and their figures tall and good; they marry late and keep their looks a long time. The father of a young man who wants a wife, proposes for his son to the bride's father, previously feeling his way carefully, as a refusal may cause a feud; then ensues a long scene of bargaining, at last ended by an agreement that the bridegroom shall give a feast, and certain presents of clothes, sheep, and cattle; this is not a bargain for the girl, but to satisfy the neighbours that her friends will not give her to a beggar: the expense of a marriage is about 100 rupees in the poor classes, hence men are often 35 or 40 and generally 28 or 30 years old before they can afford the money. The obstinacy of the custom prevents the price being lowered, though many fathers

* Kūrūt a sort of dried milk or curd: described in Yule's 'Marco Polo,' 2nd edition, vol. i., p. 257.—Ed.

would be happy to give their daughters for nothing, were they not ashamed. The desire to get married makes the Afghan sometimes trade and often plunder. When all is arranged, he is admitted to see his fiancée once or twice (alone and at night) before the ceremony; if the young couple forget themselves, it is not inquired after by her friends, but the mother rates the girl soundly and calls her a "badzat"; * but should the male relations hear of it, a bloody feud is the result. The fear of death, I believe, makes them chaste in general. This curious custom is not intended to prevent people marrying who did not like each other, as the bargain is fixed before the lover is admitted, but seems a childish experiment on the strength of virtue under temptation. The Afghans, once married, are very happy; the women are rarely beaten and often consulted; they are fond of their husbands, kind to their children, and excellent housewives. Their married life is the most amiable part of the Afghan character.

On the approach of danger the men hastily gather their flocks, take post on the hills and behind stones, and fight well for their wives and children. The women bring them ammunition, food, and water, and frequently fight by their sides. In charging some Khwajicks up a hill, the women and children threw down incessant showers of stones, at least as formidable as the dropping fire of the men: when broken into different parties they stick by their husbands under a close fire, handing them powder and ball with the greatest coolness; one or two were unfortunately hit. Even when made prisoners, the women exhorted the men to die like Afghans, and made a chief who had promised me to point out Colonel Herring's murderer, ashamed to keep his word.

These Khwajicks were chiefly Ahmadzais, men of ruined fortunes and broken clans, without lands or flocks: want made them plunderers, and rendered them so active and enterprising, that they were the pest of the country. If the first blow be followed up, they will never reunite.

The pastoral Ghilzis are all robbers when stimulated by idleness or hunger. They sally out on foot and carry off the cattle of some weak tribes, or look out for a traveller on a road. There is no calculating on half barbarians; sometimes they spill his blood like water, at others they only rob him. If he is well dressed, they exchange his fine clothes for their filthy rags, and send him away in the dress of a beggar; this is thought nothing of. Occasionally they give him a blanket when they find him naked. Unless stimulated by despair or to defend their families, the pastoral Ghilzis seldom show much courage, but fight at long shots and against weaker parties. If they return laden with spoil, their wives receive them with new affection, and the children are decked with the plunder. In the Suliman range I saw several ruffians with their children and their horses decked out with necklaces of the new Company's rupees, which as well as the "Butki" of Bokhara are admired for the image;

* Rascal.—Ed.

there was no mistaking how they had got them. They seldom cultivate crops, but procure flour by bartering their surplus wool and ghee; they have no weights or measures; one shepherd settles with another how many of his hands full equal a Kabul seer, or how many of some peculiar wooden bowl.

If questioned as to the internal government of his tribe, a Ghilzi would perhaps state that each family should obey its own natural head. All the families of a Khel should obey a malik, and all be obedient to a khan, who leads the Ulūsi troops, and is answerable for the revenue, but should not act on important business without the sanction of a "jirga" or convocation of the elders of a tribe. This has been generally considered the counterpart of our own feudal institutions, and Mr. Elphinstone has sketched a pleasing vision by which the Afghans might be civilised by a process like the formation of our own constitution. Looking on this opinion as erroneous and liable to produce bad effects if acted on, I will briefly state what seems the difference. The north of Europe was anciently covered with forests, supporting a set of hunters who must have been thinly scattered and without civil institutions. Cæsar and Tacitus describe them when the forests had been partially cleared and unruly societies established; but the interchange of lands every ten years and the frequent migration show how recently they had ceased to be hunters, and how they still clung to the roving life. While Rome remained strong, the barbarians were unable to extend southwards. At last, taught to be soldiers by many defeats, they overwhelmed the Empire as soon as it was internally convulsed, but not without many struggles, which obliged the hordes to submit to a king, and to inferior leaders armed with considerable powers.

When success was complete, whole kingdoms were parted among the men who had conquered them, the ancient inhabitants became slaves attached to the soil, and gradually from these, and from the poorer barbarians, the classes of serfs and inferior vassals were formed. The rewards of lands were given with the condition of military service, and were frequently altered in their distribution, but they gradually became hereditary, and strong ties were naturally formed between the nobles and their vassals; but an enormous distance still separated them. The barons were looked on as superior beings, and sometimes as entitled to the power of life and death: the king had lost much power, but generally was able to control the state.

In Central Asia it has been different. The earliest accounts speak of shepherds, sometimes predatory, wandering over wide plains in search of pasture, and obeying no fixed government. The Arabs and Tartars are to this day scarcely altered, and the Afghans not much so. Like all nomade tribes, they have long genealogies. They say themselves that they were anciently descended from one man; at all events there is little doubt that they were once two families, not very large, called

Turans and Burhans. The increase of population obliged them to subdivide, the former into Hotakis and Tokhis, the latter into Ali Khel, Anders, Taraks, Sohaks, and Suliman Khel. This latter tribe is now so large that it has split into several other tribes, of which the Ahmadzai is the principal. The names of Turan and Burhan are now scarcely heard. The Hotakis are the oldest branch of the Ghilzis, and the chief of the eldest family of Hotakis is considered the king of the whole. His name is Gul Muhammad; he is outlawed by the king and a price is set on his head. Each of the tribes is now divided into numerous Khels, and each Khel into a few families; the natural head of each family is implicitly obeyed; the oldest by descent of these heads of families is usually, not always, the malik of the Khel, with a power but little obeyed. It is understood that the head of the senior "Khel" is chief of the tribe, and the king often grants him the title of khan. He dares not collect any income from his tribe, but lives on the produce of his own lands; and by appropriating by fraud part of the duties on infidels and merchandise, and in the obedient tribes, part of the royal taxes. Among the eastern tribes (who are always in rebellion or rather in a state of independence) he uses his influence to head plundering expeditions and procure a good share in the spoil. His seniority in birth makes the Afghans pay him the respect of an elder brother, but nothing more. If his character is disliked, he has not even that; the lowest of his tribe eat, drink, and smoke with him. In urgent danger the khan is often set aside, and a "Toelwashtee" or leader is chosen, and while the danger lasts is pretty well obeyed. The senior family of the Anders is the Marjan Khel; there are adults in it, yet there is no khan to the tribe. All this is very different from a feudal baron followed implicitly by his vassals, and with despotic powers. The institutions of the Afghans are in fact patriarchal. Under feudalism, legislation was only for the good of the gentry (Magna Charta, for instance, to give the barons safety); among Afghans the king and khan have little influence, and measures will be good or bad as they act on the people at large.

To the king an adherent of the court ascribes unlimited power over the life and property of his subjects. A country Afghan only approves of a king provided he never raises taxes or interferes with feuds. The whole people look on resistance to taxes not as a crime but as a virtue, to be admired and imitated if possible, like the sympathy the lower orders in England have with poachers and highwaymen. Indeed, I suspect that kings are an innovation among Afghans. The Saddozai is the senior tribe of Popalzai, and therefore of the Abdalis, who themselves are the elder branch of the offspring of Saraban, the eldest son of Kais Abdul Rashid, descended from Saul, Abraham, and Adam. This genealogy, however absurd, has procured the head of the Saddozais great respect, which Ahmad Shah turned into a title to the throne. His fortunes and abilities brought him followers; his victories abroad en-

riched them, and enabled him to consolidate his influence at home by giving many jaghirs. The Duranis, thriving under the new system and never feeling the weight of the taxes, became rapid converts to it; the Ghilzis and other Afghans never liked it.

Had he remained at home levying taxes, he would have failed. The influence of his name and the habits formed by a long reign upheld the system through the time of his son Taimur; the thirty years of anarchy are well known which destroyed his institutions, foreign to the patriarchal government of the Afghans and to the genius of the people. They were also vicious in themselves, because resting on foreign plunder. At the first conquest of the Punjab and Kashmir, the Afghans, like the Englishmen in India under Clive, acquired great wealth. When the provinces were put under Afghan rulers, they might be grasping themselves, but would not allow the people whom they governed to be squeezed at the pleasure of their countrymen. They seemed often to lose the love of their soil and finally settle in their province, refusing to pay the king tribute, defeating his troops, and killing his tax-gatherers in the most approved Afghan method.

The Ghilzis had kings also when they were conquering Persia, and were not taxed for their support. They say they had them before; if so, I suspect they were merely nominal ones. The Afghans then appear to be a nation of families or a little federation of men connected by blood, more or less subject to their natural heads, and having the patriarchal institutions nearly complete. The only bond of union among these societies is their common language, and descent from one stock; they are in transition from pastoral to agricultural life, and low in the scale of civilisation. They have not yet assembled in cities, they practise no trades, and the ties binding them to the soil are still slight. Last year was a dry one, and the Sohaks of Kharwar, disgusted with scanty crops, in great numbers quitted their fields and returned to a pastoral life; even a settled Afghan puts his whole idea of wealth in flocks and herds. These remarks apply chiefly to the Ghilzis, but with slight alterations to all the Afghans. The Duranis, nearly one-third of the whole, are a little more advanced; their constitution, as given by Mr. Elphinstone, is what was established by Ahmad Shah, and is called "Ahmad Shahi"; it never took root among the other tribes, and not completely among the Duranis, who, even when they do not practise it, are loud in its praise, looking on "Ahmad Shahi" as a panacea for all evils. I may mention here that, though I have been sometimes obliged to differ from Mr. Elphinstone, the course of my inquiries has led me to a thousand proofs of the great judgment in combining evidence and simple unostentatious search for truth, which characterise that writer.

The only genuine institution of the Afghans is Pashtunwali, the code of the traditional customs of their ancestors. The grand precepts

are hospitality to strangers, obedience to parents and elders, and revenge for the injuries of kindred. No allusion is made to paying taxes and following kings. Their injunctions clearly point back to a nomade state of society, when a man depended on his immediate relations, not on laws, for protection, and when to refuse hospitality was equivalent to murder. These precepts are most closely followed by the more barbarous tribes. Among the Duranis I have heard of a khan destroying his guests at a feast; this was looked on with horror. Among the Waziris a little child would be sufficient escort through the lands of the tribe, and they are said to protect men who have killed their brothers, if they come as guests. The method of insuring safety is to sit by a man's fireside and neither eat nor drink till he promises to convey you safely to any place you wish to reach; by the Afghan custom he must comply, and either go himself or send a near relation to prevent danger. If this ceremony be neglected, food and a pipe will be freely given, but it will depend on the character of the host whether he does not rob and murder his guest the moment he leaves the threshold. When they wish to rob a stranger, they either try to civilly hinder his entering the house, or make him eat before he asks for protection. The Achikzais are said to consider themselves as relieved from all obligation to hospitality when a guest has eaten his full, and to have a right to rob him or murder him when they please. I, however, only know one instance of that feeling: uncivilised men are very apt to obey the letter and evade the spirit of a precept, but the natural kindness of the Afghans generally makes their hospitality sincere, and this rude virtue alone allows any travelling in the country; it is, however, a bad system, and should be replaced by laws and an armed force.

On a visit of importance a sheep is killed, made into "kababs" on a ramrod, and served on cakes of leavened bread. The guest and his followers sit on the best carpets, and eat according to their station out of dishes—pewter or wooden bowls. The host stands behind, pressing them respectfully to eat. After washing the hands and smoking the chillum, a horse or camel is brought for the guest's acceptance. The horses of the stranger are all amply fed. In this manner I have been entertained several times (of course not taking any present, which is easily waived): the common people confine their attentions to a hearty welcome and a profusion of their own coarse food.

The revenging wrongs is the worst part of Pashtunwali, and encourages feuds more than it punishes aggressions. Two men quarrel in a field, and one strikes or wounds the other; the relations take it up. They meet on some occasion, fight and kill a man; from that moment the quarrel is deadly; if of different tribes and the quarrel important, the whole tribes go to feud. Semi-barbarians constantly quarrelling, have always feuds on their hands.

At Pannāh there are two forts of relations who are at loggerheads.

The distance between them is only 200 yards, and on that space no one ventures. They go out at opposite gates and walk straight from their own fort, in a line protected by its walls from the fire of the other, till getting out of musket-shot they turn round to their fields. In Zūrmūl I saw a fort shut by rolling a stone against the door instead of the usual heavy chain; on inquiry as to the cause of such carelessness, the malik, a fine old man, with a plump, good-humoured face, stretched his arm out towards the line of distant forts and said, "I have not an enemy." It was a pleasing exception to the rule: feuds are a system of petty warfare carried on by long shots, stealing cattle, and burning crops. Samson burning his neighbours' corn acted just like an Afghan. When the harvest is nearly ripe, neither party dare sleep. When the enemies are distant, the feud often lasts for generations; but when they are neighbours it becomes an intolerable nuisance. Pashtunwali devises a remedy, which the Afghans extol as the acme of their civil code. This is to let both parties fight till the same number are killed on each side, then their neighbours step in and effect a reconciliation called "Nannawatt." The party who first draws blood is looked on as the aggressor, whatever may have been his provocation; he pays the expense of a feast and gives some sheep and cloth as an atonement to the others. But in case this *beau idéal* of equal justice cannot be procured by one party having more killed than the others, the price of the reconciliation is much higher, but it never exceeds a feast and a few virgins. These girls are not given as concubines (which the country Afghans seldom or never have), but are married and well treated. The expense of marriage being so heavy, to get so many of their young men well married without expense is a great object, and a real money compensation. The other party do not like it however, as to give Afghan virgins without getting presents is thought to show want of spirit.

A fertile source of disputes is the right to water. In Kattawaz is a spot called Khūni Karez, or the bloody spring. It has been claimed and stoutly contested by two tribes. One party would occupy it and bring crops nearly to perfection. Then a constant skirmishing began, on one side to destroy the grain, on the other to preserve it; but the first is more easily done than the latter, and the cultivation was always laid waste. In these combats the water was often stained with blood, hence its name. It now has not a trace of cultivation, and the water runs to waste in the plain.

The respect for elders is easily accounted for. Among civilised people, young men have the advantages the experience of ages has given in books; and better still, they are early obliged to act for themselves and form their own character. Before the body fails with age, they acquire perhaps all they will ever learn. The young Afghans, on the contrary, are as ignorant as beasts, they know nothing but their genealogies and the confession of faith. Without any means of education

but their individual experience, they for many years plough the earth, and then commit the crimes and excesses I have described. By degrees their wild independent life makes them rely on their own judgment, and gives them an acquaintance with human nature, at least in its Afghan form. As they get old they are constantly employed about reconciling feuds or arranging marriages, in which they have to reason with some, flatter others, and browbeat a third ; their fine climate and temperate habits preserve their faculties for a long time. They are much superior to the young or middle-aged men, and are respected accordingly. In all half-barbarous countries the same respect for the old men is observed. Sparta, which was about the Afghan standard, preserved the feeling much longer than Athens, where education, assemblies, and debates made the mind be quicker formed. Pashtunwali, a code good enough for wandering shepherds, when land and water were abundant for all, tended to foster the best virtues of barbarians, and probably produced a simple, hospitable, and spirited race; it has not kept pace with the increase of population, and the change from a pastoral to a settled life ; having conducted the Afghans to a certain pitch, it should now be thrown aside for a better system. Its present influence on the Afghan character is bad. These feuds cannot be carried on without falsehood, treachery, and meanness, and their skulking guerilla warfare is not favourable to courage. The hospitality daily tends to a mere worthless form. All this is very observable in the Ghilzi country.

Zūrmūl and Kattawaz, beyond the power of Dost Muhammad, pay taxes neither to him nor to any one else. They gave Dost Muhammad a few camels, but no taxes like the Anders. Sometimes they killed the people who came for the camels. The whole produce of their land was turned to their own support, and it was notorious that, in the intervals of cultivation, they scoured the neighbouring country, living for nothing, and bringing back horses, camels, bullocks, and cloth, to increase their stock; their very implements of husbandry were a tribute in some cases from the Kharotis. The soil is fertile and water plenty.

According to the most approved Pashtunwali, every man defended himself and defied his neighbours. A country exempted from the taxes which impede the increase of capital, and getting so much new stock for nothing, might be expected to be flourishing. But I found forts in ruins, karezes drying up, land ceasing to be cultivated, and tribes returning to pasturage. Every man distrusted his neighbour, or was at open feud with him. It is the custom of the country to throw a heap of stones over a murdered traveller. In the ravine leading from Shilgar to Zūrmūl the frequency of these heaps was sickening. In many cases they were at the closed end of the ravines, showing how the poor travellers had run as far as possible and then been hewn down. Such was Zūrmūl and Kattawaz. The Anders and Tarakkis have not so fine a country. They complained bitterly that Dost Muhammad had raised the

price from 10 to 22 rupees on every kharwar of rasad (800 lbs.) (rasad is supplies for troops often commuted for money), and that he took cloth at only 10 yards for a rupee, the market price. Yet their fields were more thriving, and themselves more comfortable, than the Suliman Khel. They accounted for this every way but the right one—that in return for this tribute they had been partly protected, and feuds much diminished; these complaints of theirs must be taken in part, as Afghans will cry out when they pay taxes. Nothing but the dread of an armed force ever makes them submit.

In Kattawaz, Akhtar Muhammad, chief of the Jalalzais, told me he was afraid to ride across the valley alone. His story illustrates the subject. His father Taj Khan headed the whole tribes, and partly by his own hand, partly by plunder, made himself a man of great importance. When he died, his son, who is a good-looking young man with rather a good character, attempted to carry on the system, but his younger brothers claimed their share in the patrimonial estate, and with the land took many of the Ulūsi. Akhtar Muhammad could not then withstand his enemies, and is in great poverty. Though respected by his tribe, he scarcely gets 300 rupees a year.

The people of Kattawaz, with all their discord, have united more than once. Some years ago, a son of Dost Muhammad, Afzal Khan, tried to reduce Zūrmūl; his troops penetrated by Kolalgu along the western line of forts of the Anders. Some he destroyed, others he passed; but at Nashkel he was met by nearly all Kattawaz, and was defeated. Again, when our army approached Ghazni the Suliman Khel, allured by reports of our wealth and effeminacy (they said we were Hindustani sheep coming for slaughter) and excited by Dost Muhammad speaking of the Nang-da-Pushtoneh (Afghan honour) and the mullahs promising heaven to those killed by infidels, they came in a tumultuous rush from all quarters; but the head of the throng being promptly charged, the whole dispersed. Again, when the force with Captain Outram arrived at Mish Khel, many of the tribes burned their grain and forage to prevent us entering Kattawaz, and we had to go round by Pannāh and Ashlan.

As an instance of a foray, I extract from my journal an account of Mihtar Musa's chapao.

Mihtar Musa is the son of Yahia Khan and head of the Sultan Khel (of Suliman Khel). He is a shrewd, plausible man, and has acquired more influence than any other man of the tribe, and as he has an Ulūs of his own, he is a formidable enemy. In want of some live stock, a few years ago, he despatched his family drummer to every Khel in Kattawaz, to announce that on the third day he would head a chapao. The rendezvous was Burlak; several thousands assembled with every sort of weapon from a rifle to a club, and some horse, some foot, poured in a disorderly torrent over the pass of Sargo and fell upon the lands of

the Waziris, surprising their flocks and camels in great numbers. The Waziris occupied the gorges and crests of their mountains, and saw their country ravaged. But at night signal fires were lighted on the hills, and the whole tribe came, tolerably armed and eager for vengeance.

The Suliman Khel had attained their object; some carried their plunder home, and I believe part, under Mihtar Musa, passed into Daman to collect a little more. The Waziris formed a bold resolution. They crossed the hills by paths known only to themselves, and pounced on Kattawaz while their enemies were absent, guided to the flocks and herds by one of the Suliman Khel, and then returned home richer than before. The Suliman Khel was greatly vexed at being so outwitted, and had no resource but negotiation, as entrapping the Waziris twice was hopeless. After much swearing on Korans and giving to each other some unfortunate Syads as pledges of their faith, all the cattle were restored on both sides, except those *bonâ fide* eaten or over-driven on the march. The Suliman Khel made up for lost time by plundering a weaker tribe, and the Waziris by attacking the Lohanis. These anecdotes have been introduced to illustrate the subject; they are characteristic, and have been confirmed by more than one person, but I do not pledge myself to their exactness except where I personally saw the facts related.

In general, forays are on a smaller scale, sometimes they are mere thefts. They seldom plunder near their own houses, and have an understanding with other predatory tribes, by which the cattle taken are passed along by secret paths. When Afghans are robbed and cannot help themselves by force, they negotiate. Ten or fifteen rupees will generally redeem a camel worth 40 or 50. I have been amused by seeing a thief, who had stolen some Lohani camels, come (with a safe conduct) quietly into the camp, and after a great many compliments, sit down to settle the redemption of the camels; he wanted 12 rupees for each, saying they were fine animals (as the owner well knew), and when they offered 10, he asked indignantly if they meant to cheat him. Even the Waziri chief, Jangi Khan, between whom and the Lohanis a war of extermination had for a hundred years been going on, came into their camp about some camels he had stolen. Had the safe conduct been informal, they would have spilled his blood like water.

The Afghans are generally praised among Asiatics for love of truth. This must be received with some limitation. They have no abstract love for the moral beauty of truth, but their scattered simple life, where everything about a man is known to all, and where there is little buying or selling, takes away many of the inducements to deceit, which inhabitants of towns possess; but to a stranger, or where anything may be got by it, I must confess the Afghans make no scruple at falsehood: I heard a similar account of some hill tribes in India when first seen by Europeans. An Afghan swore by all that was holy he had never hired a young man

as his servant nor owed him a year's wages; but no sooner did he find that the case was fairly going against him, than he brought a mass of evidence to prove he had paid him.

The courage of the Afghans must not be compared with our own, the result of organisation in one of the finest people of the globe. Judging them by a fairer standard, that of their neighbours, they appear to advantage. They beat off the Persians at Herat, and once conquered their country; they kept a province across Hindu Kush taken from the Uzbeks; they frequently invaded India and there founded dynasties. The Rohilla Afghans are notoriously the best soldiers in Hindustan, and the general opinion of Asiatics allows bravery to the nation. I am afraid the general opinion of our army is the contrary; and it contains so many men of judgment and experience, that I cannot help stating the grounds of my singular opinion. Our easy success, always objected, was, I think, the result of other causes; an army conquering a country always thinks lightly of the people. We expected to find the feudalism of Europe in an Asiatic dress, but in a vigorous state, and every one anxiously longed for the day when the Afghans would come charging to the bayonet's point. The fruit and climate had been always praised; grain scarcely heard of. Unfortunately (for the army, i. e. for its chance of fighting), we had the king with us. The Duranis, disgusted by thirty years of anarchy, and by seeing their frontier recede from Bahawalpur to the Khyber, and by no longer enjoying the best places in the country conquered, were anxiously looking to the king's restoration as the first step to regaining what they had lost. Mehrab Khan was busy in outwitting himself, and Kohandil Khan was vainly trying to make the Mullahs declare it a "Ghazā"* or war against infidels. This he could not effect, because his bad government had disgusted the people, and his joining the Persians against Herat had roused the indignation of every Sunni. Under these circumstances it was not likely that we should be seriously opposed. The opponents to this view of this case always asked: If these brave Afghans are partial to us, why do they not join us? The question is a difficult one, but people after long convulsions seem to sink into apathy. Thus the simple proclamation of the Duke of Brunswick roused all France to arms and made her mistress of the Continent, till, worn out by her over-exertions, she tamely saw her capital twice entered by foreigners, and her bravest shot like a dog. The Afghans just so, would not oppose us, although they would not join us. Another great help was the strict discipline of the army. They saw with astonishment our cavalry horses die of hunger and the corn stand untouched in rear of the column; this was often mentioned with wonder by the Afghans.

The Ghilzis, on the contrary, detest kings, and especially Durani ones. They see a prospect of paying taxes, and curse "Shujawal" for

* Ghazā is the war and Ghāzī the warrior against infidels.—Ed.

bringing in infidels. The hill tribes, Waziris, Kharotis, &c., trust still that their mountains will keep them independent, and, I think, care little who rules at Kabul. The large and civilised body of Tajiks were, when I saw them, much pleased with the new system; the influx of money and the prospect of protection securing their attachment.

The old system of taxation among the Ghilzis was a very bad one. The khan directed the Khels to bring their quota, and presently saw lots of rotten sheep and toothless camels arrive at his gate. These were bought on the king's account at high prices and sold for what they fetched. Blankets, grain, and a little money, made up the remainder. There was always a deficiency in the amount, and the khan usually took half of what he received, and gave the king the rest with an apology; sometimes the king allowed him to take a certain share. There have been no taxes collected at Kattawaz for a long time, but I give the account as I heard it.

The great obstacles to the improvement of the Afghans are the feuds and the difficulty of internal travelling caused by want of a government. Whatever the form is, if the government is a strong one, it will be useful here; but to overawe the robbers and clear the road, troops are required. I can say from experience that Afghans can be made to submit to discipline, but with difficulty; except the hill tribes, the people have a great dislike to serving on foot. As they are hardy and fond of the service, they might be made useful cavalry. The Kabul ponies also are cheap and hardy. Desertion is not looked on as a crime, but as an indefeasible right to go home. The Durani horse under Muhammad Osman Khan Saddozai, accompanied Captain Outram on the Ghilzi expedition. They complained bitterly that though their pittance of pay was only 10 rupees a month for man and horse (with by-the-bye grass given them), that out of five months' arrears given at Kandahar, their leaders had taken two months' pay. I saw that when 700 rupees prize money was given to be divided among them, only 400 were spent on the men. They often declared that under officers who were as conscientious as the "Feringi Sahib" they would have made a different appearance for the last thirty years. With such a system it is no wonder they plunder the country and frequently disperse.

For infantry I think the Tajiks, Moguls, and even Hazaras might be advantageously employed. They are hardy, active and obedient, and have often behaved well. At Herat some, certainly, of the garrison were Moguls (Tajiks).

To pay the troops, a better system of taxation is required; this question presents peculiar difficulties. Ignorant people are the last to appreciate measures for their good. The pastoral tribes moving from place to place will fly to the mountains at the sight of a tax-gatherer, and were all money levied on the soil (exempting shepherds), it would be a premium on pasturage which possibly might cause the country to be

without agriculture, because the shepherds can easily procure grain cheap in Daman, and have no need to buy from the settled tribes, and thus be taxed indirectly. Again, there is scarcely any money in the country; the eastern tribes traffic entirely by barter. If payment were required in specie, the people would bring their produce all into the market at once, and sell them to Government when the market was glutted, and consequently to their own loss. I think it might be introduced gradually, at first twenty miles round each town, and the circle extending as money became more plentiful and the traffic of barter less. The rotten sheep and toothless camel system is hopeless, and taking it in grain, even were it advisable, is impracticable from many tribes.

A better taxation and a strong government would, I am convinced, alter the country in a generation. The land is not rich, but capable of good crops where water is procured, and the supply might be increased. The people, I think, have the seeds of many virtues, which are only obstructed by a wretched system. This is the great crisis in Afghan history. Brought for the first time into contact with a civilised nation, they already feel their inferiority in the sterling qualities. Their barbarous virtues of respect for elders, their rude hospitality, and their frank independent manner, will probably disappear; and should their barbarous vices of revenge, treachery, and murder be merely changed in form, but not really altered, then the consequences of our advance will be deplorable indeed. But the course of events in placing our troops so suddenly in Kandahar, and our influence at Herat, have already made all prophesying the future absolutely ludicrous; and I hope we have seen the first step to raising the Afghans high among the people of Asia.

These opinions are given with diffidence, as I am aware how hard it is to come to right conclusions about the feelings of a whole people, especially where those feelings were undergoing a constant change under astonishing events. But even if found to be erroneous, they may serve a useful purpose, by showing the impression produced by considerable intercourse with the people during a stormy period. My opinions were slowly and carefully formed, and have been candidly stated.

J. S. Broadfoot,
*2nd Lieutenant, Engineers.*

Kurnal, 19*th January*, 1840.

## REPORT II.

*On the Route from Ghazni to Dera Ismail Khan by the Ghwalari Pass.*

First, my own route.

The country from Ghazni to Pannāh has been already described; the distances are (by the road)—

| | | |
|---|---|---|
| 1. Ghazni to Nani | .. .. .. .. | 14 miles. |
| 2. 18th October, 1839, Joga | .. .. | 13½ ,, |
| 3. 19th ,, Pannāh | .. .. | 10½ ,, |

All this day, the 19th October, I was an object of curiosity: women came and lifted up the purdah of the tent and looked at me, some smiling, others looking with horror, but none seeming to imagine the possibility of indelicacy. Whilst dressing, it was all the same: the children sometimes stole in, calling me "Pelingi," with bits of bread for me to eat: there was a crowd the whole day.

*20th.*—To Dand, 12 miles. The road at first crosses a few easy hillocks, then a plain; at the eighth mile, turning round the end of Jarakkana, a road, saving a few hundred yards, goes over the ridge, which is here a few black rocks at the top of a gentle slope. From this point we went between some low hillocks. Near Dand a dry watercourse is crossed, with banks four feet high; the whole road is very easy for guns. Near Pannāh the villages and forts shown in the plan would supply a brigade with grain and forage, and water is abundant at all of them.

At Dand there is no other water nearer than Dihsai or Nannai; the first a large village of Anders with perhaps 100 houses, the latter a group of four or five forts of Anders and Suliman Khels. Dand is a fort with thirty houses of Shakki Suliman Khels, with about 150 acres of cultivation. Near Nannai is Schnakhzie, two forts of a tribe of Suliman Khels. At Dand the only supplies are water and camel forage.

The people here show the most undisguised hatred of the Feringis, and of the Lohanis for introducing them. They give false answers to every question, and say that they will never consent to have their country written down.

For the first time in Khorassan, I judge it necessary never to leave camp alone, even if well armed; my life now being certainly in danger if met alone. At Dand the caravan halted for a day in order to allow the Mian Khel Lohanis to join for safety's sake. The strength now was three camps of about 200 men, each with women and children in proportion, and camels out of all proportion. A crowd of men and boys attend me whenever I move out, which is but seldom. This and the white tent let out what the native dress would have concealed. The dress is

a lungi turban, a lungi kamrband, a chapkan or very loose, long, camel's-hair gown, trousers stuffed into boots which come above the knee. When I ride, these are put into a pair of green shoes, which keep the boots and feet warm. A pistol and dagger in the belt and my sword by my side. In riding, over all a poshteen.

21*st*, a halt.

22*nd*.—Sixteen miles to Killa-i-Langar.—The first four miles are over a plain, ascending easily to Kattasang, and the next three through Gazdarra. This is a pass evidently formed by water flowing into Kattawaz, through the hillocks formed by the spurs of Zhera and the end of Kattasang. At first it is 30 feet wide, with a level bottom, bounded on either side by hills easily ascended. In the middle of the pass is a space of half a mile, where the width at bottom is only 20 feet, with the hills at the side 200 feet high, and the windings frequent and sometimes sharp. After this it widens gradually into the plain. A few small springs issue from the crumbling rock, but are soon lost. Guns could be dragged through the pass in its present state, and a few hours' labour would make it a good road. There is another and similar pass a mile or two to the north, it is called the "Little Gazdarra" (Gazdarra Khurd).

From here we emerge to the open plain of Kattawaz and pass Zarghun Shahr (green city), a fort, about fifty houses of Ballo Khel—a branch of the Suliman Khel, and about 500 acres of cultivation; of this, much is fallow. From thence we gradually descended to Langar in the centre of the valley, passing the stream near the fort. It was 20 feet wide, one foot deep, and the current two feet per second; the water is slightly brackish. The banks four feet high, but easily passable in many places. In spring this is scarcely fordable. Langar has two forts containing about eighty houses. The larger fort is a square of 100 yards; the mud walls, 20 feet high, are flanked by eight towers. The walls are not above six feet thick, there is no ditch, and the gate is uncovered; yet this is one of the strongest forts in Kattawaz.

At the bottom of the Kattasang hills are Mest and Shigana, a few forts of the Suliman Khel, and the only watering-places between Dand and Mish Khel. Kattasang, as viewed from near Dand, appears a mass of undulating hills and as bare as a desert; it is a resort in summer for some pastoral families of Suliman Khels.

On entering Kattawaz, from every man there was a burst of abuse against me, though the dress prevented them from recognising me till told by the Lohanis which was the Feringi they had come to see. At the halt they crowded round the tent and threw stones. I struck the biggest and foremost a blow under the ear. He grasped his sword. I did the same to mine, and they went away. Nothing but the presence of the Kafila prevented my murder. I could not go out all day, but was stewing in a close tent with the door tied up.

Several chiefs came at last, afraid to venture to Kabul and afraid of the consequences of not going. Among others, the brother of Mehtar Musa Khan. I found out a plot to catch Sarwar Khan and me as a hostage or perhaps from revenge. The chiefs I could in a few days bring in. The people are different. Except the Mian Khel who trade a little, they are all thieves and good cultivators. The people have never paid tribute, and hate us for making them do so. They hate the Shah as a Durani.

23*rd*.—Shincha, pronounced Shintsa, 13¾ miles.—The first 2½ miles are through the cultivation and fallow of Langar, and the deserted fields of Khuni Karez, which give a good supply of water; then the ground gently rises towards the hills, which are seen near the pass in several parallel ridges sprinkled with trees. At 11 miles are two ruined forts, whose waters have now dried up, one of them was called the "Ghlo kalla" (thieves' fort): their feuds destroyed each other. From this point we enter the Sargo Pass. It is a ravine cut by water through the Kohnak range, and winds in easy curves. Its width, never less than 30 yards, is often 100. The ascent is scarcely visible, and the hills on either side easily ascended; the bottom is sometimes rough and heavy, but two hours' work could make it an excellent road. At 13 miles is the cultivation of Shintsa; there are no houses, the cultivators being migratory; but a little watch-tower commands the field, and shows by its machicoulis defence and its gate, scarcely to be reached, how little certain the owner was of reaping what he sowed. This seems an example of the method by which the Afghans change from pasture to agriculture. The small Khel had eked out the livelihood gained by their flocks by a little cultivation, irrigated by the water of the spring which runs along the valley. The necessity of levelling the ground for irrigation, and of erecting the watch-tower, have given them some ties and a claim to the soil; but they still leave it at the approach of snow, to come back in spring, and have not yet relinquished their tents for houses. The coldness of the climate obliged the settled Ghilzis to live in houses; the Duranis, whose country is warmer, live mostly in tents, of which Afghans are passionately fond. Under a government, these families, with increased means of support, might increase in numbers, dig karezes, and extend into the plains, becoming firmly attached to the soil; the chance at present is, that some feud will drive them from their little fields and make them again return to their wandering life; I have seen instances of this retrogression. The hills are sprinkled with thorny bushes and low trees, giving fuel in abundance; the spring is plentiful, but grass scanty. High up the mountains of Kohnak is the fort of Omna, in which robbers, when pursued, constantly find refuge.

On the road, having little to survey, I entered into conversation with a Sikh, whom the Musalmans were tormenting about the never-failing subject of religion. I asked him why he did not change; at which he got

into a rage and said, "Feringis change their religion for a pretty girl, the Musalmans were no better, while he was of a perfect religion that he would die sooner than give up." This he roared out with much violence, and to my surprise the Musalmans only laughed, especially when he accused them of filling their bodies with earth by burying their dead, while his people burned them in a clean fire. On being appealed to, I said I hoped good men of all religions would go to heaven. At this there was a general "Shahbash," or expression of approval.

The Hindu said we had got the gate of Ghazni opened by money, but that if we tried the Punjab we should be beaten. I smiled, and said it was written in the heavens that from China to Damascus must be ours. He was silent, this being the general belief in all these countries.

24*th.*—Surghurgai, Red rocks, 12 miles. The Kafila started at day-break, the cold being less and delay expected on the road. The road for three miles ascended gradually; undulating in slopes, passable for guns. There was an ascent of 20 yards, the angle about 11 degrees, with a few stones requiring breaking; next, for two miles, a level ravine 30 or 40 yards wide, winding among hills, steep on the north side and rounded on the south. From this point we descended at a slope of about 3 degrees. The hills covered with bushes, and a little rivulet accompanying us to the halt, where the space is wide enough to encamp in; the road requires a few hours' labour. Fuel, water, and camel forage are abundant. From the Kotal-i-Sarwandi commences a descent continuing without interruption to the Indus. This, and the fact that from Kohnak the Attock is often visible, first decided my opinion that the Jadrān was the principal range of the Suliman Mountains. I estimate the height of the Kotal-i-Sarwandi ("Kotal" means a pass over a ridge, as "Darra" implies a passage between mountains) at 7500 feet, by referring it to that of Mūkkūr as determined by Lieutenant Durand and Dr. Griffiths.

25*th.*—12 miles to near Othman. The first six miles are down the pass, now a shingle reach 400 yards wide, and very straight. The rocks bounding it gradually sink to the Killa-i-Babakar. This is inhabited by Kharotis, who have shown great skill and perseverance in conducting water to every little spot of soil within miles of their fort. The fort has a little garden and is in good repair. Being the only place of supply for caravans within several marches, there is always a quantity of chopped straw for sale. A tower of refuge has been built on a rock commanding the fort; to this they fly on any danger, and prevent by their fire any injury being done to the crops or garden below them. The main stream of the Gomal rises here, several springs join near the fort, and flow over a fine small shingle, the stream rapidly increasing till the halt, where it was 12 feet wide, six inches deep, and running four feet per second. The banks, three feet high, and the bed 200 yards

wide show that the river is considerable in March. This channel winds in tortuous curves all down the valley. Near the fort is a place called "Kwaro Kats" ("Kats" or "Kach" in Pashtu means a place, and especially a wider space, in a narrow pass, where the rocks are 1000 yards apart, and where caravans frequently halt). We bivouacked in a spot of similar character. The road presents no difficulty; water and camel forage plenty.

26*th*.—Sirmagha, 13 miles. The valley at first was formed as before, of the level winding channel cut by the Gomal through high cliffs. After a few miles the bases of the Waziri and Maranna ranges approach each other, and confine the river into a narrower space and higher rocks, the curves are also much more frequent. At eight miles the Dwoa Gomal ("second Gomal") makes its appearance, from a ravine similar to that just described. This stream rises near Sirafza, and flows through the Kharoti country, draining the Waziri and Kohnak ranges; the Koh-i-Waziri, cut into a thousand channels by rain, looks very different from the smooth hills of Khorassan, from which they partly intercept the monsoon. They are about 2500 feet above the Gomal, and sprinkled with trees. Whenever I asked their name, the answer was "Wazir da Gharda." They are the hills of the Waziris; but at different points they have different names, as Sazamkai, Waraki, Chini, and Khangal Margha. Othman is a widening of the valley to a space large enough for a camp. The Dwoa Gomal is of the same size as the other. From this point a reedy grass in frequent patches would give a supply of bad forage for horses. In the ravines, at some distance, is a supply of a better grass, called "Washa." Water and camel forage of course abundant.

27*th*.—Ahmadsi Kats, 11½ miles. At one mile we passed Sirmagha, a halting place 500 yards wide and a few feet above the river. At 2½ miles, the salt rivulet of Ab-i-talkh enters the stream; from thence the channel is narrow, and winds to every point of the compass in bends at every 300 yards, yet I never saw it less than 30 yards wide. At seven miles is Mamatsile, "Māmā's tomb," a great white rock in the centre of the pass, where it again widens and grows straighter. The little stream winds so frequently, that it is crossed sometimes seven times in a mile. This is so annoying to the men on foot, that they often climb the hills the whole march rather than be constantly pulling off their shoes. The shingle here is composed of larger stones, some of them a foot in diameter; but there is no serious obstacle to guns.*

28*th*.—Stighai, 10½ miles. For the first five miles the Gomal wound so much that the horsemen and idlers went across the hills, rejoining it three miles lower down. The camels, of course, continued by the river. The crossing was very frequent. The breadth of water here is 20 feet

* Lieutenant Broadfoot in his journal remarks, "To-day I was very careful, there being a report current that the chiefs had hired men to take or kill me."—Ed.

and the depth one foot. At 7½ miles we left the river, and proceeded up a level ravine 40 yards wide, and bounded by low rocks or hillocks, often passable for cavalry. Our camp was in a dry plain 300 yards wide. Water was brought from the spring nearly a mile distant up a ravine on the north. The pioneers would have some work in clearing away the stones of the Gomal, but there is no real difficulty for guns. The Washa grass was now abundant.

The Sultan Khels of Prirak plundered many servants to-day, taking good clothes for old ones, and sometimes giving none at all in exchange. They say openly I shall be shot one of these days, and that only my disguise has saved me hitherto; I believed this to be humbug for some days, but now so many people of all tribes have told me, that I mean to be very careful. In this country generally, and on this road particularly, all emotions are absorbed in a constant dread of murder. Many men have refused the most tempting offers to come a march with me, saying that whatever I may give them will be taken away by robbers in the 10 miles going back. They never leave their houses without putting on rags, in hopes no Afghans who meet them may have worse. It is a singular state of society.

29*th*.—Betsal, 14½ miles. The first mile and a half was over the same easy ravine to the Kotal of Stighai. This is a low ridge crossed by three paths, all equally good. The ascent is about 150 yards of a broad level road not at all steep. From this an easy ravine leads gently down to Touda China (" warm spring "), a fine spring eight miles from the halt. At the sixth mile is a smaller spring with scarcely water for a regiment; at 11 miles the road runs along the side of a hill, and crosses it in a place called Gatkai, where there are some troublesome large stones. From this we descend the bed of a rivulet which drains part of the Waziri country, and must be large in the rains, as it has cut a wide bed, 30 feet deep, into hard slate. The ravine is crossed by camel tracks, but I saw none fit for guns. Afterwards a stony plain continued to Betsal, which is a collection of graves of Lohanis who had died in the pass. Alim Khan Miyani had procured from Kabul some fine marble slabs for the tomb of a favourite son. The rest are heaps of stones; water, grass, and forage are abundant. This march is one of the most difficult; and a road could not be made under a day's hard work, the last three miles about Gatkai being so difficult. If necessary, this obstacle could be avoided by keeping down the bed of the Gomal. A woman was robbed, on the roadside, of a gun and some clothes, and the thief escaped.

30*th*.—(Hill of Treasures) Khazāna Ghund, 11½ miles. At first we crossed the desolate plain of Samblabar Raghle (" we have reached the black plain "), the boundary, as it is called, of Khorassan and India. At 4½ miles we turned the hill of Stighai and entered the channel of the river by a descent (not difficult) of about 80 feet. The bottom is stony as usual; a wretched hut gives the name of Khair-o-dangar to this place.

At eight miles is Janekats; this place is named from a great Waziri robber, who at last fell into the hands of the Lohani merchants and was there hewn to pieces. At Janekats are three acres of cultivation and the entrance to the stream Zawrewan, said to come from near Birmul. At 10 miles is the isolated rock with a flat top called Khazāna Ghund, which the Lohanis believe to be full of the treasures of Nadir Shah. The channel of the river was wider, and not so stony this march. Grass and forage as before.

31*st.*—Gulkats, 14 miles. The camels followed the whole way the stony bed of the river. At four miles is an encamping ground called Trappa Una; from thence I mounted on the high bank by a steep, rocky passage, and entered a small plain under the hill of Ursak; this is a steep, craggy ridge, about 800 feet high. Advancing further, we entered the wide, stony plain of Zarmelănă, and saw the Takht-i-Suliman towering in a mist above the inferior mountains, its base extending to the south past Wohwa, and the north beyond Ghwalari. At the tenth mile we descend into the valley of the river, here three miles wide, and being covered with reedy grass and low shrubs, it looks at a distance like a field of corn, and is so pleasing to the eye that it has been called the "place of flowers." The march as usual is stony; water, forage, and grass abundant. We are now rid of the wandering Sultan Khels, and I am not pestered with people opening the tent and staring at me like a wild beast. Six camels were carried off in the evening.

1*st November.*—9½ miles near Kanzurwalli. After six miles of easy plain is Khatt-i-Kharga-una, a large mound of clay which splits only in vertical or horizontal directions, and takes something of an architectural look; a very lively fancy might see at a distance Egyptian temples and fine colonnades, but no European imagination could conceive it anything but clay on a nearer approach; nevertheless, the Afghans maintain stoutly that there was once an ancient flourishing city, but a man committed incest with his sister, and the Deity turned the whole city upside down to punish the guilty pair. From thence the same easy plain continues to the halt. There was no water at the place, but every man and beast drank before leaving the Gomal. A supply was carried in skins, and the horses were ridden in the evening to be watered at the river. There was no necessity for this. The road by the Gomal is even easier than before, but it is a march longer, and the Afghans were tired of the bed of the river.

2*nd.*—Tor Dabbar, "Blackstone." The hills of Zarmelănă send out a spur to the east, which reaches the Gomal; we crossed this in the Kotal of Kanzurwalli. The first mile is an easy ascent, the next half mile is steeper, and the path either at the bottom of the ravine or along the south slope of rocks; the rock was a hard, splintery slate in vertical strata. There was then a longer descent, but of the same character. Guns could not go by this road without a day's hard labour from the

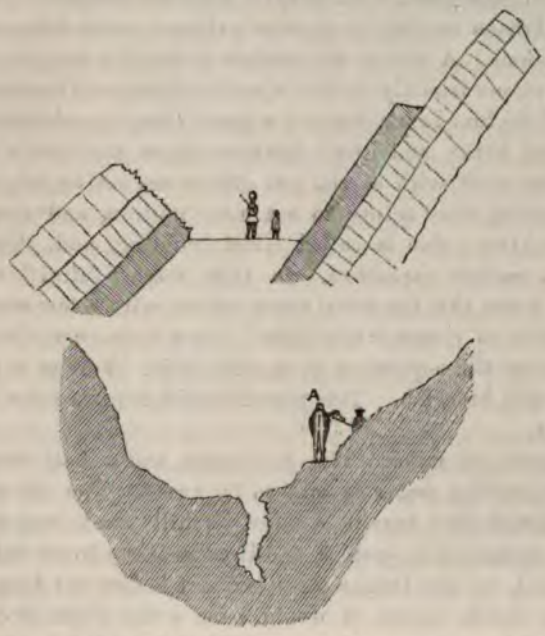
pioneers; but of nearly 1000 camels who passed with me, I did not see one throw his load. After passing a plain nearly a mile broad, we again entered the valley of the river; this ran in wide, straight reaches of easy shingle. At eight miles is an insulated rock, with two trees and beautiful reed grass. This place is "Kotkai," and a little to the north are Spin and Toe of the Daotanis, and Wāna about two marches distant; this march has abundance of water, grass, and camel forage.

*3rd.*—12½ miles to Gatkai.* After two miles we reached Shahidan, a number of graves of merchants slaughtered by the Waziris, and called by the Lohanis the "martyrs," to throw odium on their enemies. After this the hills on each side branch off, leaving an undulating plain, in which the Gomal is met by the Zhob. This stream, 30 yards wide and one foot deep, is larger than the Gomal; its valley could be seen for at least 40 miles in a straight line parallel to the Takht-i-Suliman; its waters are reckoned peculiarly sweet; I thought them just like those of the Gomal. At 11 miles is a small date-tree standing in a spot called Postakats, where large caravans usually halt, that they may drink the Zhob water before crossing Ghwalari. From this we enter the pass, an easy ravine leading by a few windings to Gatkai*; it is sometimes only 25 yards wide with a level bottom, the sides being high perpendicular cliffs of pudding-stone. The rain has cut these into deep, vertical clefts, which have a somewhat architectural appearance; when the conglomerate ends, clay slate begins, and Gatkai* is a place where the ravine is only 20 feet wide with a fine level bottom, but nearly blocked up by two rocks about eight feet cube, which have fallen from above. At present it is only passable by one camel at a time. Water is procured here in plenty, but it is brackish.

*4th.*—Mishkinai, 12 miles. The road for 150 yards gradually ascending in sharp bends, is only 10 feet wide, and shows by its level bottom that it had been cut by water. A few loose boulders were scattered about. The slate was disposed in parallel strata. The right-hand side of the ravine, being the surface of a natural layer, was smooth and hard; while the other side, being the ends cut through by water, had crumbled into soft clay; for a few hundred yards this ravine is sometimes wide, sometimes only four feet at bottom, but always like that just described. The ravine at last ends in a rough channel only two or three feet wide, and cut deep into soft earth. This might be easily made into a road, but it is not necessary, as a path, much better, gradually ascends to the space marked A† just above it; this is called the little Ghwalari, and is just beneath the real pass. The slope, which had been very gentle, now became so steep that loaded camels went up with some difficulty (yet they never threw their loads). The road was a zigzag, going up a spur of the hill and gaining an elevation of about 300 feet; the top for 400 yards is a rough plateau, descending slightly to the east, then we go

* Gati on Map.—Ed. † See next page.

down a steep ravine for 600 yards, the slope from 10 to 20 degrees, but always wide enough for a road. Some large stones would have to be removed, and then the guns might go down by drag-ropes. Below this the pudding-stone cliffs and fine wide road begin again and continue



with increasing width to Mishkinai. At Rammu a spring of water is usually found, it is always brackish and sometimes dry. Near the halt there is a little stony plain, the eastern entrance to Ghwalari. The water at Mishkinai is brackish; plenty of forage is found at a little distance.

5*th*.—Chingankram, 9 miles. The first two miles led along the north side of the Tsirai rock; this ridge is laid in parallel strata of limestone

mixed with clay; the ends of the strata are broken and decomposed, but the west side is the surface of a natural layer of rock, and extends for miles as smooth as hewn stone. As the ridge is 700 or 800 feet high, this has a most strange appearance. We then turn to the right, round the end of one hill, and enter a narrow but smooth ravine, which after a few hundred yards, is entirely blocked up by a large perpendicular rock 60 feet high; this place would be of course utterly impracticable had not a road been cut, gradually ascending the side of the ravine till it

reached the top of this rock; a little labour would make it a good gun road. As the Afghan who cut this has shown more public spirit than I have seen in any other man of his nation, I am sorry his name has escaped my memory. This pass of Tsirai may be avoided by a longer route which goes direct from Mishkinai to the Gomal.

The Afghans having no regular artisans, must help each other on many occasions. A person who wishes to build a fort, sends to his own tribe, and others friendly to him, a notice that he will entertain any one who will help him in his design; a great many people attend; they eat mutton and kūrūt, and drink buttermilk, at the host's expense. In return, some work with spirit, but others are active only at the feast. In the evening they return to eat more mutton, and sing songs, and dance the Attan; this is called Ulūsi building, and, though pleasant enough, is rather expensive. In this way "Tsirai" was rendered passable. From this the usual stony ravine with a few scattered Palosa trees or tufts of coarse "Sirmagha" grass leads on to Chingankram, a pebbly valley three-quarters of a mile wide. Forage is plentiful, but the water still brackish. This march would require a few hours' labour on the road.

*6th.*—Zirtā, 12 miles. The first mile and a half brought me to Zmarri, where the water is said to be sweet. The everlasting stony ravine widened after turning a ridge, its hills sunk into mere hillocks, the boulders turned to pebbles, and it came fairly to an end. Mounting a small knoll, we saw Daman stretched out before us; to a person fresh from more fertile scenes it would seem a flat plain of clay and sand covered with a monotonous jungle of thin tamarisk; but to us, who had passed 180 miles of brown rocks, it seemed a picture of beauty. The shingle brought from the hills covers the plain for four miles past the halt, but we soon entered the reedy grass jungle on the banks of the Gomal, where it penetrates the hillocks of Zizhi, under which we encamped. Manjigara, of 100 houses, could afford a little supply of grain. Wood, water, and camel forage are abundant.

*7th.*—Dera Ismail Khan, 49 miles. This march occupied 23 hours. During the day I kept up my route survey, but soon after passing Kulachi darkness and fatigue rendered it impossible. The distance, however, I still continued to note, and the directions are judged from the stars. In four miles we passed the hillocks of Zizhi and re-entered the thin tamarisk jungle. We saw several villages in the distance on either hand, as, skirting the old bed of the Gomal, we reached Luni; this is a large village of 400 houses, with a well in the bazaar; but most of the water seemed to be got by digging holes five or six feet in the bed of the river. At 17 miles was Kulachi, with about 700 houses and an excellent bazaar. It is surrounded by a weak mud wall of three or four miles in extent. Supplies to a large extent might be got here and from the surrounding country. The road lay through an open plain.

Proceeding from this in the dark I could only see that we passed much cultivation and several villages, and that the tree jungle grew less as we approached Dera. One mile west of the town the Sikhs are building a fort with double gates and a good ditch; but the walls are exposed from without, the ditches imperfectly flanked by round towers, and the ramparts narrow except in the bastions. It would when finished withstand anything but a regular siege. Dera Ismail Khan is well known, so I do not describe it.

To clear these passes, 500 pioneers would be sufficient, a proportion of these (50) should be armed with crowbars and sledge-hammers, a few (4) sets of blasting tools should be always at hand. The rest might be armed as usual with pickaxes, shovels, and a few hatchets. With these means and a little energy the army might march by this route with only the usual halts. The Pass of Gazdara, four miles beyond Dand towards Kilalangar, is no obstacle. That of Sargo, through the Kohnak range near Shintsa, would not oblige the troops to halt, and the bed of the Gomal as far as Ahmadsi Kats requires little clearing; from thence to Gulkats the stones are large and troublesome, but they could be cleared away by 500 pioneers at the rate of 10 miles a day—this would be severe work; or if the road of Stighai is followed, the army might arrange one of its halts so as to allow a day for making a road in Gati. The Kanzurwalli Pass, between Gulkats and Toradabar, would require two days' work, and as it involves a march of 18 miles to get water, it should never be travelled by guns, for which the Gomal road is the only good one.

The first pudding-stone rocks of Ghwalari would resist any instruments, but luckily they always have a fine road between them. The clay slate which succeeds is very rotten on the outside, but such rocks are sometimes hard beneath. The "Kotal" itself is of slate crumbled into earth and apparently easy to cut. To blast the two fallen rocks of Gatkai, four parties of three men each would be necessary; by heavy jumpers and large charges these rocks would be shattered in a day. While this was going on, a party of the line, directed by pioneers, could gather every one of the loose stones above in a heap at Gatkai, and when a passage was cleared, roll them down the wide pass out of the way of the road; at the same time also, 200 men could either prepare the zigzag ascent for guns, or make a steeper and straighter path. The remaining pioneers and parties from the line, could form the descent and clear the first mile on the eastern slope. With every allowance for delays, I think the road should be passable for guns on the second day. A track a few yards to the north could be easily widened to a fine camel road; and, if necessary, a different column with all its baggage could go over the Manzi Kotal, which is within three miles of Ghwalari to the south.

The Ghwalari Pass I conceive to be easier to make practicable than

the Kohjak, and not nearly so difficult for guns when completed, as the horses here may be kept in nearly to the bottom of the steep slope, and there they had to be replaced by drag-ropes the whole way. The baggage also may pass in three columns, instead of being, as at the Kohjak, jammed for days on one narrow camel track. The water of Ghwalari, though brackish, is abundant on both sides; that of the Kohjak was sweet, but on the west sadly deficient, even in the month when there is usually most.

As the caravans are large bodies of men, horses, and camels, their method of supplies is like that of an army; grain or flour, from Kattawaz to Luni, should not be expected. The Daotanis of Wana and the people of Zhob bring rice and flour, and the Kharotis bring goats for sale, but in an army these small supplies would be scarcely felt. A month's supplies would enable troops to reach Kattawaz, or, if in small bodies, Ghazni; but it would be most advisable that supplies for two months should start from Kulachi along with the army.

Forage for camels is always abundant. In Khorassan the usual "Tirkha" covers the ground. In the pass it is mixed with tamarisk and other shrubs; in Daman it is entirely tamarisk, which requires to be noticed. Camels coming from Khorassan immediately they eat the tamarisk of Daman get looseness of the bowels, and they are usually crossed over the Indus quickly to obviate this. This I saw. The people, however, constantly declared that the camels coming from India find no ill effects from the food.

The caravan was able to buy chopped straw for the horses every day till we arrived at Shintsa; but for a large army supplies would have to be brought and laid in beforehand. In this country, however, the grass-cutter could procure some grass in the usual manner. From Langar to Killa Kharoti the Kafila carried chopped straw for the horses, and again from Killa Kharoti to Stighai. This tract might have a very little wild grass in it, but it is absolutely necessary that for these marches forage be previously collected. I speak of what I saw in the end of October. After the rains of spring, I believe that the country as far west as Killa Kharoti is covered with the "Saba" or "Washa," similar to the long-bladed grass which is given to horses at Simla and Mussooree, but I think rather sweeter and better. Below Ahmadsi Kats in all seasons this is abundant. The constant march in spring of large flocks of sheep, camels, and cattle, destroy all that is near the road, and leave naked brown rocks as far as is seen; but even in autumn, by proceeding up the ravines abundance will be found. To assure myself of this fact, I sometimes went among the hills alone, and would have gone every day had any one agreed to accompany me. Every brigade should have five or six Daotani or Lohani guides, who would show the grass-cutter where to find it; and of course an escort of fifty or sixty soldiers should accompany the foragers of each regiment. These

guides could easily be procured either in Daman or Khorassan, were they well paid and neither struck nor abused.

In spring I am convinced that (after April begins) there would be no scarcity of grass on any part of the route.

Water at the dryest season is always abundant, and sweet in every place but Ghwalari, where for two marches the springs are brackish. Out of all the Kafila, I could only hear of one man on whose stomach it had any bad effect.

Fuel in Khorassan is the usual brushwood which covers the ground; in the pass there is a slight addition of shrubs and stunted trees; in Daman there is jungle. An army going from Dera Ismail Khan to Ghazni might form the magazines at Manjigara or Luni, and have Ghwalari prepared by well-escorted pioneers sent in advance; from that point they may choose their own marches.

### Comparison of the Ghwalari with the Bolan Route.

As I have not seen the Khyber Pass, I will compare this route with that of the Bolan, and it will serve to allow others to form their own judgment on points where my opinion may have biassed me.

The route from Shikarpur to Kandahar is very difficult. After two marches of jungle the Mulk-i-Kachi is entered. This is a plain of hard clay, as level as a billiard table, with scarcely a blade of grass or a shrub as far as the eye can reach. The water is also most precarious; one march of 28 miles is a total desert, and generally there are only a few hamlets at wide intervals, the mud huts of which are scarcely to be distinguished from the plain. The poor inhabitants dig holes in the earth, and watch for hours till a little moisture collects, and the scanty supply is eagerly baled out and stored for use. Sometimes they send a mile for a little water, and I saw it sold in camp for a rupee a gallon. The camels, in poor countries the life of an army, began to fail through starvation, and laid the foundation of our subsequent losses. Bhag and Dadar, of 500 and 300 houses respectively, allowed us to halt and gave us water. The Bolan Pass was a level shingly ravine, bounded by hillocks, and very similar to the channel of the Gomal, but is totally deficient in camel forage and fuel, and water at parts is scarce. Except when rain fills a puddle in the Dasht-i-Bedaulat ("hopeless or poverty-stricken plain"), a march of 28 miles is necessary for water; even then camel forage and water are the only supplies. Quetta, and the fertile valley of Pishin, can support a small body of troops; but in advance is the same dry, stony plain, which is also cut up by ravines. The hills then have to be crossed. There are three passes,—the Kohjak, which was crossed by us; the Roghanai, 10 miles to the south, is difficult for camels; and the Ghirrigh, easy in itself, is rendered useless by there

being three long marches with scarcely water for a regiment. After forcing the guns over the made road, and the camels over one narrow path, we found on the western slope a scarcity of water, and three long marches had to be made under the pains of thirst. At last, when we reached the cultivation of Kandahar, our horses were starved, our camels were failing, the men had dysentery, and the road behind us was strewed with the bodies of camels and horses, and of men who had been murdered when they lagged from exhaustion. Much of this might, no doubt, have been avoided by better information; but yet when we consider that in Katch Gandava filling up about 100 wells would leave 60 miles of march without water, and that the Bolan (easy as its road is) is exposed to floods in winter, and to the fatal simoom in summer, I think it will be allowed that that route is impracticable against well-directed opposition.

The Ghwalari ridge is nearly as bad as that of the Kohjak, and the constant drag over loose shingle would batter the feet of the artillery horses. Hindustani camels soon get sore-footed in any stony pass; they sometimes poison themselves on the hills by foolishly eating the wrong shrubs, which no Khorassan camel will ever do; and the horses generally, unless shod in the Afghan fashion by plates covering all but the frog, would go lame in great numbers. Yet in spite of these disadvantages, I look on this route as superior in all essential qualities,—in those of climate, water, fuel, and forage. It opens also in the best part of the country, and threatens alike Kandahar, Ghazni, and Kabul. Out of the thousands of camels who pass this road twice a year, I only saw two skeletons, while the rear of our army was covered by them; and during my whole journey I never saw a camel throw a load; these facts show that the difficulties are more apparent than real. This pass has the advantage of many roads leaving and again rejoining it, allowing columns to be divided, or opposition to be turned.

### Different Roads on this Route.

From Pannāh to Killa Kharoti are three routes; one has been described; the second has six marches.

1. From Pannāh to Nanai Ghund. Near a fort of Shakke Khel, water and camel forage are to be had.

2. Khinjakak, a ruined fort of Shahtori Suliman Khels. There is a karez. The road crosses Zhera, but is easy.

3. Burlak of the Shakhel Jalalzai. Water and a little supplies (for a small force) to be procured. Road an easy plain.

4. Jaffar. A spring like Shincha in the entrance of the hills.

5. Kargadzala (crow's nest). A spring.

6. Killa Kharoti. Already described.

The third is the route of Adin Khel, and is held to be the best of them all. The marches are easy, but long.

1. Pannāh to Dokāi or fort of Schnakhzi. Already mentioned.

2. Adin Khel in Kattawaz. The road turns the southern end of Zhera; small supplies to be had. The Adin Khels who are Kaisers fight the Jalalzais who are Shammals.

3. Masso Khel, a migratory Khel with only one fort. Road easy.

4. Kargadzala. Described.

5. Killa Kharoti. Described.

Besides these three easy roads, another, fit only for infantry, goes under Kohnak to the north of my route. From Killa Kharoti a camel road goes to Wazikhwah and then to Kandahar. Caravans of Nassirs travel this way.

The next road to be noticed is that of Maranna. It leaves the river by a ravine half-way between the Dwoa Gomal and Othman, gradually ascends over the crest of the Koh Kallagai by a road, camels easily pass; from thence it descends among ravines, crosses the Ab-i-talkh, and passing Ghazamanda rejoins the Gomal opposite to the place where the Stighai road leaves it.

The Stighai road, turning part of the Gomal, I have described.

A path goes from Stighai to Khai and thence by Spest and Shartbazu, to Killa Mama in Wazikhwah. A similar path also goes from Khair-o-dangar to Wana. In spring these roads are rendered of more importance than they would otherwise possess, by the Gomal, swollen with rain and melted snow, frequently filling its whole channel and rendering the great road unsafe. The tribes who come up in March or very early in April do not follow the Gomal, but proceed from Ghwalari to Kachana, where there is a spring; thence to Spin, which is a mile or two north of Kotkai. This march is long, but said to be pretty level. Then to Kanzurwalli and Khat-i-kharga-una. From thence they again diverge from the river to Zarmelăna and to Betsal, or they go from Kharga-una across the lower end of Ursuk, and so by Zawrewan to Stighai, where the Maranna road is followed to near the source of the Gomal. These roads are stony and long; they would never be taken by caravans but for fear of a rise in the river.

As an instance of these sudden floods, I relate what happened to the Engineer camp in the Bolan Pass. We were pitched in the dry channel of the rivulet at Abigum; the clouds had been gathering round the peaks to the west; at three o'clock in the morning a loud roaring noise in the glens was followed by a rush of water through the tents, washing away everything loose, and wetting us in our beds; every one started out, and the tents were struck by the torrent in a few minutes; the camp was inclosed on all sides by much deeper water rushing past with great noise. It was pitch dark, and there was no escape; marks placed in the flood showed the waters sometimes rising, sometimes falling; at last

they subsided, and the day broke; but had they risen a little more, the whole camp would have been drowned.

In the Gomal Pass, after the beginning of April, there is no danger of such accidents as these. The river getting less and less in summer is a mere rivulet till December, after which it fills with melted snow and rain.

The eastern part of Afghanistan is a plateau from 5000 to 7000 feet above the plains of the Indus, and supported by its vast buttress—the Suliman range. The drainage of large mountains and wide plains flowing down from such a height to the Indus, has in the course of ages cut deep channels in the hills, all evidently made by water, with flat bottoms and bounded by high rocks, but differing in size and convenience for travelling, according to the quantity of water which formed them and the nature of their rocks.

South of the Khyber and Momand passes, the first of importance is Kuram. The road commences near Gardez, and generally follows the channel of the river to the Indus; at first it passes through the valleys of the barbarous Jajis and Turis, and then through the lands of the Bangash and Bannuchis. I have no good information about the marches, but the general impression of all travellers is, that the Kuram river is the best entrance to Khorassan, whether for supplies or easiness of road. The tribes are very wild, and buying the protection of one will not serve caravans in the lands of the others. This is perhaps the reason (otherwise unaccountable) that this pass, if the best, is so little travelled. The next pass is that of Tank; one road goes from that place direct to Kaniguram, and another road reaches Kotkai on the Gomal in five marches; they are:—

1. From Tank to Sir-i-ab, entering the hills.

2. Shuhur Narai; Narai means a "kotul," or pass, over a mountain; an easy kotul near Shuhur.

3. Dargai Narai, another ascent.

4. Spin, already mentioned.

5. Kotkai on the Gomal.

The next pass is that of the Gomal at Ghwalari. This has more than one exit. The river has forced its way through the end of the Takht-i-Suliman range, dividing Ghwalari from the Karkanna hill. Its channel, called Adamkak, is said to be narrow, with the Gomal falling over large rocks, and to be scarcely passable for cows and sheep, of course not for camels and baggage; three miles south of Ghwalari is the route of Manzi; crossing the same ridge in a higher place, this road diverges from the great one at Postakats:—

1st. Postakats to China, a brackish spring sometimes called "Munza-quenna"; * the road a tolerably easy ravine.

* As I do not recognise this word, I leave it as spelt by Lieutenant Broadfoot.—Ed.

2nd. Gati, a spring of brackish water; the road crosses the ridge by an ascent, said to be a little steeper than that of Ghwalari.

3rd. Easy ravine to Mishkinai. Caravans frequently go this way, but Ghwalari is the favourite and of course the best route.

Next, the road of the Waziris goes from Ghwalari to Kattawaz, opening by one route upon Gardez, by another at Riltu. It avoids the Gomal entirely, and is described by many people of different tribes who had seen it, as much superior to the Gomal road; as grass is very abundant, the hills covered with wood, and supplies for a caravan (of 1000 people) to be had from the villages on the way, all this I believe; but when they declared (even independently of each other) that there was no ascent worse than the trifling one at Stighai, from what I had seen of these mountains, and from the careless way travellers without wheel carriages speak of difficulties in a road, I could not help feeling great doubt. Probably this road would be found a good one for cavalry or infantry, but a very bad one for guns; caravans would always choose it were they not afraid of passing the heart of the Waziri country. The following marches must be very short, probably not averaging seven miles:—

1. Ghwalari to Karkannai, a small plain of good soil irrigated by the water of Spin. When Sarwar Khan of Tank attacked the Lohanis, part of them fled to this valley and cultivated it with success; when the danger was over, they returned to their wandering life.

2. Spin, a few miles north of Tora Dabbar; the road an easy ravine.

3. Michan Ghundai, a small hill over which "carts could go"; the man who said this had seen hackeries in India. The water is still the Abi Spin. The road seems to go to the north.

4. Wana. This valley is cultivated by the Daotanis; supplies and water to be procured.

5. Swai Ghwajh. A space in the bed of a stream, said to flow to the Bangash country. On leaving Wana is the kotul of Matsal, said to be very easy.

6. Waukhwah, a wide space in the same valley; there three wells are said to have been made by Nadir Shah; Nadir, I believe, was never in this pass.

7. Matsal, a pass over the Khwenda Ghar range, which seems to be parallel to the Koh-i-Waziri.

8. Rohamand Gūl Kot. A fort of the Waziris.

9. Tursam Kot. These forts seem to be in a narrow valley between the Khwenda Ghar and Poshtai ranges.

10. Kasim Kot. This is a fort, and an evidence of cultivation and water.

11. Samand Kot. A fort.

12. Yari Kot. A fort.

13. Zmarri torai.

14. Spedar Narai, a pass over the Pashtu range which seems to rise from the Jadrān range, and is partly inhabited by the Jadrān tribe.

15. Sarobai of the Kharotis.

16. Urghun of the Fermuli Tajiks.

17. Khangal Margha. Near the head of the Dwoa Gomal.

18. Sultanai, entrance to Zūrmūl and Kattawaz.

19. Paltanai in Zūrmūl, inhabited by Minzis (who lately were notorious robbers).

20. Kolalgu. In the plan.

This road is sometimes varied by going through Spin, Toe, Wana, Birmul, and Sarafza.

Opposite Daraban is the pass of Zawa which leads to Kandahar. As Lieutenant Marsh of the cavalry has visited this route, I shall merely mention those connecting it with my own route of Ghwalari. It passes the Takht-i-Suliman, the Zhob 30 miles above Postakats, and is connected with the Gomal by the road of Kundar.

From the place where the Kundar joins the Gomal to—

1. Hosainika, a ziyarut in the ravine of the Kundar; from this place a camel road goes to Zawa.

2. Khaddal, the tomb of a murdered man of that name.

3. "Navel stone," Nama Kanai, a stone thought to reduce hernia of the navel; the road is still by the stream of Kundar, which flows through an easy ravine.

4. Kandil, the source of the stream. There is usually here a little cultivation of the Zhmurianis, a small tribe said to be Syads; and in summer there are some Nassir shepherds.

5. Orak, a spring in the mountains which seem a continuation of the Jadrān range. Generally there are few tents of the Lili Khel.

6. Mashhuri, a fort in the valley of Wazikhwah. The road crosses the hills by the pass of Imdai.

7. Killa Mama in Wazikhwah, and from thence to Kandahar. This road has water and forage for camels; the road is said to be passable for guns, but I doubt it much.

The road going from Kundar to Zawa is—

1. Hosainika, mentioned above.

2. Gwedab, a small spring.

3. Sritu, a fine spring. The road then descends to—

4. Mandu Khel da kot, a fort in the valley of the Zhob, after crossing the river.

5. Daraban, mouth of Daraban Khwarra, from whence the water of the Daraban flows.

6. Zawa, the pass.

These marches are camel marches, varying from 10 to 14 miles. The last road especially is dry and rough; the other is probably passable for an army, but with difficulty.

A few miles south is the Dahna Pass, which has a larger stream than that of Zawa flowing from it, and being much blocked up with stones, it is a resort of robbers with stolen camels. It joins the Zawa route by a different pass.

Still further to the south and beyond the Takht-i-Suliman is the road of Wohwa,* passing through the Kakar country to the Arghesan river, and thence to Kandahar. The road is said to be easy, but I know nothing about it.

In the event of the invasion of India, so much talked of, our natural frontier is not the Indus, but the Suliman range. History, which shows that even great rivers have never obstructed the passage of an army superior in the field, gives very few instances of the storming of mountain passes.

This long chain of hills is only passable in five places,—Khyber, Kuram, Ghwalari, Zawa, and Wohwa or Vihova. I put the Bolan out of the question, as the water is easily cut off 60 miles in the Kach Gandawa. Of these the Khyber, Kuram, and Ghwalari are the most important. They lead equally to Kabul, Ghazni, and Kandahar, without the possession of all which places the attempt could not be made. A fort near Ghwalari would secure the entire command of the three roads leading from it, and forts might be probably equally well situated in the other passes. The whole length of the passes affords numerous positions where field works, and a body of determined men, would delay the most powerful army for days; and among mountains, where the supplies laboriously collected cannot be replaced, and where every hour's delay is fraught with danger.

Were an army of 60,000 men distributed in three divisions opposite Kuram, Khyber, and Ghwalari, their magazines and means of crossing the Indus well secured, they would receive decisive information of the march of the enemy in time to concentrate at the threatened pass long before he arrived; and were the 20,000 men already guarding it driven to the plain, the scattered columns of the enemy, slowly emerging from the mountains, would be opposed one by one to a powerful army well supplied and fresh with the whole resources of India at its back; all this is independent of the opposition which might be so easily afforded in Khorassan. Supplies for an army can be only permanently procured at Kandahar, Ghazni, and Kabul. Were these places occupied, and the little surplus grain and grasses in the country round bought up and stored in the cities, which had been put into a state of defence, the hostile army would be without means for extended siege operations. It would be nearly starving, and if it plundered it would be lost.

The Afghans, eminently a movable people, would all go to the hills. In no country has the people at first joined even a popular invader; it waits to see his success; and the first serious check is the signal of

* This is the Vihova of the map of Afghanistan dated Simla, 1871.—Ed.

his ruin. Indeed, the more I saw of the country and reflected on the subject, the firmer grew my conviction that, while the British in India continue true to themselves and just to the people, their position and resources may defy all attempts from without.*

The country from Ghazni to Dand has been described in the first report. Kattawaz merits a separate notice.

Its length is about 48 and its breadth 24 miles.

The plain is level and open, bounded on the east by the Kohnak Mountains and on the west by the lower hills of Kattasang and Zhera. To the north it reaches Zūrmūl, and to the south is ended by Lalazai and the Ab-i-Istadah Lake; the valley is entered on the east by the three passes which meet at Killa Kharoti, and on the west by the passes of Gazdara and Kharbin. This last road goes from Mish Khel between Spinsak and Jarakkana. It is a winding pass, generally 30 yards wide, between low hills, which cavalry might often cross, and leads by a gentle ascent, through the lower range, and then with as gentle a descent to Melanai. Guns could pass it in its present state, and a very little work would make it a beautiful road; a small rivulet called Khurbin flows down part of its length, and turns three or four miles before it reaches Kattawaz.

This district entirely belongs to the Suliman Khel; the settled tribes living in the centre of the valley, and the pastoral ones wandering about the lower spurs of the mountains. The tribe has two great divisions, the Shammals (or Ismailzais) and the Kaisers; these often fight with each other. The Khels are generally groups of five or six forts, each containing from ten to sixty houses. I mention the Khels as they occupy the valley from north to south. Mish Khel, Sultan Khel (a large one), Poindeh Khel, Mitta Khel (who sometimes trade), Mallazai Shakki Khel, Sheh Khel, Kallandar Khel, and the Adin and Nassu Khel. Beyond these is Lalazai of the Tarakkis; the feuds have been described before; sometimes the Mollaha effect a truce to last a stated time, when this is ended the feuds begin again. This relic of barbarism

* Lieutenant Broadfoot here proposes two ways of meeting an invasion from the north-west. The first, namely, to make the Suliman range our frontier and to hold the passes, is that which commends itself to my judgment. Holding that frontier, we are in a position to await with calmness any attempt at invasion. Every day that we delayed the invader's forces would tell most heavily against them. Food for the army and fodder for the animals would run short, and that would, in all probability, lead to collision with the Afghans. With this frontier held in force, we have little to fear from an enemy on the other side of the hills, so long as the Indian army and people may be relied on. I would therefore expect an enemy's tactics to be, by every means at his disposal, to stir up and foment discontent; and to delay active measures till well assured of co-operation in India.

The second mode of meeting invasion, namely, to occupy Kandahar, Ghazni, and Kabul, is not, I think, now to be recommended. We should be surrounded by a hostile people, and have long and uncertain lines of communication. The position, I venture to think, would be a false one from a military point of view.—Ed.

existed till lately in Europe. When the caravans passing through Kattawaz are too strong to be overpowered without loss, they are only required to pay a small tribute to the tribe whose lands they pass. When they are weaker, the impost is a little higher, and if only a few individuals, they are usually plundered. The general tax is one rupee, or rather 12 yards of coarse cloth for every eight loaded camels.

Infidels pay more. The traders always choose their road through Kattawaz with reference to their friendly relations with the tribe. I may mention here that from Kattawaz to Daman money has no fixed value, being nearly unknown. The method of exchange is mere barter, or by valuing everything in yards of "karbaz," a coarse cotton cloth made at Multan. This represents small sums of money; large ones are only known as so many sheep or camels.

The Dwoa Gomal rises at a hill called Durtsely, very near Paltu. Its course is then between the Kohnak and the Waziri ranges; this last I believe, from the shortness of the Dwoa Gomal and other circumstances, to originate in the peaks of Paltu. It diminishes and ends near Ursuk.

The Prirak and Maranna range from the Killa Kharoti goes, I believe, to the Shinkai hill. It is the resort of a set of wandering shepherds, the Khwaid Khel, Elalzai of the Suliman Khel. It suddenly breaks up and ends at the Kundar river.

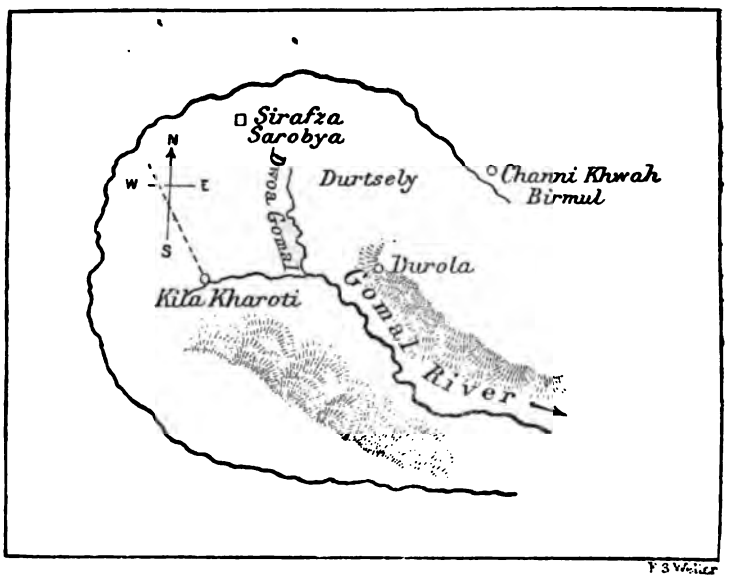
The hills to the west of the Zhob appear little less than the Takht-i-Suliman. The Zhob rises in the Kākar country, and then flows through a long straight valley inhabited by the Mandu Khel; this is a large tribe extending from the Gomal to near the Kākar country. They live generally in tents, but have also a few houses, probably built from fear of the Waziris, who occasionally come from their own hills, and sweep the valley of the Zhob. A year or two ago they surprised a fort when there were only two or three people in it; these were put to death, and the cattle, grain, flour, and clothes carried off. The Mandu Khels cultivate rice in considerable quantities, as well as joar, wheat, and Indian corn. They all have sheep and camels, and some tribes are entirely pastoral. The women are fond of ornaments, but can afford no better than a brass pin in the nose, and large earrings or necklaces of cowrie shells. The men wear, when it is cold, the "kohsai," a cloak made of white felt, and in the hot weather have nothing but a pair of trousers and shoes. This exposure of the naked breast, and the costume of the women, which is petticoats without trousers, is thought very indelicate by the other Afghans. The reason perhaps is, that their climate is hot in summer, and snow rarely falls in winter. They are a quiet people, who carry arms only in their own defence; they have no order of course. Being allied to the Kākars, and having the same habits and customs, I have described them at this length; as of the large tribe of Kākars I know little. Here at their northern limit they are said to be a quiet people, repelling attacks

indeed, but nothing more, never carrying arms, and looked on as unwarlike. Perhaps this good character is from comparison with the Waziris; on their boundary the Syads of Peshin represented the Kākars as incarnate demons.

### Hill Tribes.

The hill tribes are so much alike in every respect, that a description of the Kharotis and noting a few minor differences in the others may serve for all.

The Kharotis inhabit the valley of Dwoa Gomal, the peaks east of Paltu; the sketch below will illustrate the positions of their forts; of course there is no pretension to a scale in the sketch. Sirafza, a few miles from the source of the Dwoa Gomal, is a fort containing twenty houses, and affording protection to the families around. Sarobya * is a ruined fort with a few houses. Channikhwah has been the constant source of quarrel with the Waziris, who have destroyed it twice, but have never been able to hold it. Their method of attack was to come suddenly in great numbers, and before the Kharotis could gather, bring heaps of wood to the gate and burn it down; once in, they murdered and plundered. The Kharotis have now built a large fort, and tilled the




ground again. Durola is a fort of twenty houses, similar to the Babaki Killa described in my route; these places are cut out of the hills, or are on little knolls, and all level soil has been carefully cultivated. Yet these cultivators are not the fiftieth part of the tribe: the mountains being covered with trees must have soil, and water is not deficient, so

* Or Sarobai.—Ed.

that the hill, if cut into terraces as in the Himalayas, might be much better cultivated. But the hill tribes, less civilised even than the other Afghans, seemed to prefer the wandering life. They have seen sheep, cows, asses, and mules, but horses are unknown. Their whole wealth consists of large flocks of goats, which feed on bare peaks or in ravines covered with pines. They live in tents of a few blankets, and sticks, or in rude huts cut out of the hill. In spring the people live entirely on milk, which is abundant, as the kids are then born. Ghee, kurut, and cheese are made in large quantities, and sold in Kattawaz or Zūrmūl for flour. In the winter they eke out their milk diet by a small portion of bread; their clothes are a shirt made of black blanket, made by their wives, and sandals (called shappli) (chapli) of goat-skins nearly raw; sometimes they have a bit of blanket for a cap, or if lucky, exchange some wool for a coarse turban. Their houses have nothing in them but a rug and an iron pot, yet with all this poverty they have fine matchlocks and good swords. Their greatest delight is stalking the deer. The pines on the hills furnish a seed called chilgoza, which is a principal part of their winter food, added to cheese, kurut, and occasionally some bread. Yet with all these hardships and their severe climate, they are a healthy, robust race. Even for Afghans they are very dirty. They have no weights, measures, nor means of estimating time and distance. Right to soil is only thought of in cultivated spots; a piece of grazing land, however long occupied by a family, is intruded on by a man even of a different tribe without ceremony; this shows how thin the population is. The pine seeds, however, are considered to be property, and a stranger must not gather them. The Kharotis are divided into two tribes; the Zakke Khel, of which the Mallik of Sirafza, son of Gul Khan, son of Shadi Khan, is the principal person; and the Adi Khel, whose head is Samand, an old man. These chiefs have not the slightest power, but a certain respect is paid to their birth; when two men have a dispute, they sometimes fight it out, but the neighbours and Mullahs generally interfere and attempt reconciliation; should one party refuse to abide by the decision, the neighbours give up speaking to him; and herding goats on a hill, without any one to talk to, or a pipe to smoke, is so unpleasant, that he soon gives in. This rude kind of jury is called a "marrika." When they are threatened with attack, a jirga or marrika is called, and all the armed men obey its orders. The Kharotis sometimes buy, but generally make, their own powder.

The Yia Khel is that which trades with India; they soon acquire some wealth, and with it a taste for fine clothes and good food: when they go to see their hill friends, they cannot help showing dislike to a milk diet and pine seeds, after eating bread and grapes; indeed, they complain that in a few days it gives them spasms in the stomach; this makes them be thought effeminate coxcombs. The Kharotis are hospitable and kind, they seldom attack tribes unprovoked, and have

fought more successfully with the Waziris than any of their neighbours. A traveller is safe in their country, and as far as milk diet will go he need never want food.

The Jadrāns inhabit the east slope of the Jadrān range; their country is small, and they are seldom heard of, so that they must be few in numbers; their food, dress, and livelihood are those of the Kharotis, except that they are great robbers, and protect all thieves. The Khwajaks, a tribe of robbers, talked of a certain Killa Nakk of the Jadrāns, where they would have defied us. The Jadrāns sell their wool and cheese at Gardez; though I entered their country once, I never saw them.

The Waziris possess the whole hill country (with a few exceptions, noticed hereafter) bounded by Gomal on the south, by the Jadrāns and Kharotis on the east, and the Kuram on the north. A branch of the tribe extends along the Koh-i-Safed; they are more peaceable and settled than the rest; their numbers are less than so extensive a country would seem to indicate, as many of them emigrate every cold season to the hills overlooking Daman, and in the hot weather return near the Kharotis. This country is stated to have wood, water, and grass in plenty; some valleys are partially cultivated with rice, millet, wheat, and barley. The rice crops prove there is plenty of water in some parts. Their successful forays have given them a great stock of camels, sheep, and cows, which enables them to add meat and bread to their food. In spring they live principally on milk. Their dress is that of the Kharotis. The Waziris are at war with all their neighbours, and on every side they have made conquests. From the Kharotis they have taken Birmul. The Jadrāns are confined to one ridge; and the whole country of Zhob, and the Ghwalari Pass tremble at their very name. The secret of this is, that without internal government of any sort, they agree well with each other. They are declared by their enemies, the Lohanis, to be Shiahs—this is a calumny; as also that they are descended from some (a few) Hazaras who fled before Nadir Shah, and have increased in these mountains. This is universally believed, but they speak Pashtu, and I have seen so many tribes retain their language for generations, that I cannot imagine these have lost theirs in one hundred years. The Tajiks still speak Persian, even when living in Afghan villages. The Firmullis, who live between the Waziris and Kharotis, are still unable to speak Pashtu. The Waziris go on foot, and are most active in the mountains; a few great men of the tribe have horses, but of course are bad riders. They generally attack caravans by night, but sometimes by day. While firing from rocks, they eat sometimes a little raw flour, and from this also a story is raised that they never cook their meals. To get wonderful stories about them is very easy, but real information very difficult, as no sooner is one of them caught by another tribe

than he is slaughtered. The Waziris are much under the influence of the Syads of "Urmur" (?),* and one of the stories is, that a Waziri, tired of going several miles on a pilgrimage to a place where a Syad had been murdered, invited a Syad to his house, and killed him a few yards off, that he might have a "ziyarat," or place of pilgrimage, without going so far for it. Their ordinary warfare is by long shots, but if really provoked they sometimes make desperate attacks. While passing their country in a caravan, some of the merchants rode to a village of Waziris from which they heard the men were absent; they returned with a few camels, and boasted they had speared some little boys in their mothers' arms. The Waziri village sent some Daotanis to redeem the camels; the Lohanis agreed, provided some camels they had formerly lost were given up; no sooner was this done by the Waziris, than the merchants told them "their wives were bad, and they should get no camels." On this the Waziris armed and fell on part of the caravan, and totally destroyed the males of every age, carried away the camels and property, leaving the women untouched but disconsolate in the pass. I was in Daman then with the head of the caravan, but heard it from some men from the rear; the breach of faith about the camels was only because the Lohanis and Waziris have so many blood feuds that no fresh injury can increase their ill-will, and no good faith could reconcile them. The Waziris never injure females nor take their jewels, but all males they invariably kill. This is not a rule common to all Afghans, but made by the Waziris; and their enemies are so fearful of driving them to extremities, that this rule is observed on both sides. Even by their enemies, the Waziris are allowed to be very hospitable; a man who has killed the brother of another, need only go to his house to be treated as an honoured guest, and a little girl would serve for escort through their whole country. They stick closely to each other, and their neighbours constantly allow that they are famous for speaking truth and for their courage; with all this they are habitually robbers and murderers.

The daily observation that the Afghan virtues flourished chiefly in the most barbarous tribes, and are compatible with atrocious crimes, first convinced me that Pashtunwali was radically bad, and that the Afghans are in a very low state of civilisation. This is difficult at first to conceive; so many instances constantly occur of individual intelligence and good feeling. These give hopes of their condition for the future, but should not prevent a candid statement of what they are now.

The Waziris are divided into three tribes—the Alizai, whose head is Jangi Khan; the Balolzais of Nisrat Khan; and the Ahmadzais (these must not be confounded with the Ahmadzais, Suliman Khel, who are also pastoral robbers) of Khan Muhammad; the principal are the Balolzais, who cultivate the valley north-west of Kaniguram. Jangi Khan and

* "Urmur" or "Umur." The name is written thus in two MS. copies of the report I cannot find the name in Sir C. Macgregor's book on Central Asia.—Ed.

his tribe are sometimes praised for their moderation; the Ahmadzais are the great robbers, and all migratory. An idea of their boldness may be formed by the fact that last year they plundered the fields of Tank within view of the Sikh garrison.

The Damtanis, pronounced "Daotani," are a tribe of about 600 families, who inhabit the valley of Wana (a march north of Zarmelāni), and grow rice, wheat, and barley. They are a quiet tribe; their small numbers oblige them to court both the Waziris and their enemies; they are a useful means of communication between both parties. The Waziris gave them Toe and Spin, because the Lohanis were always plundering them. Their agriculture makes them a little richer than the Kharotis, but their habits are similar. The Firmullis are a Tajik tribe, who live in a village at Urghun, cultivate their land, and have artisans. They speak bad Persian. Their employment is chiefly smelting the iron of their hills, and sometimes carrying it to Kabul or Kandahar; but the Kharotis are the principal carriers of this iron by Wazikhwah to Kandahar, and to Ghazni and Kabul. They do not buy the iron, but simply lend their camels for hire.

## Trading Tribes.

All the trading tribes are generally called Lohanis, but more properly those of Daman only. The Lohanis are in fourteen camps or "kilis"; they average 100 men each, with women, children, and camels in proportion. In summer they live in fine large "ghizhdis" tents of felt, near Pannāh and Karabagh; the men are partly away in Bokhara and Samarkand trading, or buying and selling at Kabul; the women and children, with a sufficient guard, live in the tents. In autumn the tents are stowed away in a friendly port, and men, women and children, and animals go down the Gomal pass to Daman, bivouacking all the way; they then pitch their second set of tents, kept always in Daman. The men go to Lahore and Benares by long marches, hoping to be back before April; some men stay of course to guard the families and the camels. In April they go up through the same pass to their old places in Pannāh and Karabagh.

The Nassirs are a much larger body, probably 5000 families. They trade little, but possess large flocks and herds, the produce of which gives them grain and clothing. They very seldom plunder; they leave Daman in March when the Gomal is flooded, their reason is that their sheep are with young, and lambs born in Daman are smaller and weaker than those born in Khorassan; the flocks go by the Zawa pass, and join the Gomal at Kundar; the herds go by the Gomal, either waiting till floods run off, or avoiding them by taking the routes I have mentioned.

The six camps of Kharotis follow the Nassirs in April, but before the

Lohanis; their time of marching is the best of all, the river is not in flood, and the heat is less.

The Lohanis make part of their march in very hot weather; the river is then low. Grass is found as high as the Killa Kharoti, green and sweet; when I saw it, it was dry but still good. The Lohanis are wealthy, and constantly attacked by the Waziris; these skirmishes are generally at long shots, by which one or two men are killed, but sometimes the attacks are more serious, though in a small society of relations, the loss of even one or two is serious.

In the evening, camels are often carried off from the hills where they are grazing. The drummer (an important person, and called a "musician") beats a peculiar sharp roll, and all young men are expected to go. The thieves drive the camels up the ravines, pricking the beasts on with their swords; the merchants follow after. The robber is seldom caught even if the booty is rescued. If caught, and a Waziri, he would be slaughtered. If a Suliman Khel, they would not kill him for fear of another blood feud with a powerful tribe; but his beard is anointed with ghee and set fire to in the middle of the camp, its crackling and blazing call forth shouts of laughter (hair burned off in this manner is said never to grow); his eyebrows are then shaved off, and he is let go; sometimes a rough clyster is administered by setting the robber on his head and pouring water into his body till his stomach is enormously distended. This punishment is held so disgraceful, that a man seldom goes home to be laughed at by the women, but banishes himself for life to Bokhara or India.

The Lohanis, who boasted of killing Waziris when at a distance, no sooner entered the dangerous country than they showed a most ludicrous terror. Watchmen were shouting out the whole night that they were very determined, and were not to be trifled with, exhorting enemies to keep away, and every man fired his gun (loaded with ball) in any direction, to show he was awake. We saw little of the Waziris, however, as they had already moved to the lower valleys, and had they not been foolishly provoked, no part of the caravan would have suffered.

The camels of the caravans are not in strings, but each is separately driven; good camels (even with heavy loads) go three miles an hour by this method. The men run after the camels with heavy sticks, driving them by blows, and giving deep bass shouts of "Ha! ha! ha!" The women and children join their shrill voices in the cry.

The Lohanis show their wealth by braiding the hair of their children with gold coins, and ornamenting their women with massive earrings, and covering their horses with expensive trappings. Young brides are carried on cushions of silk on the backs of camels most gorgeously hung with tassels, coins, and bells. The older married women (though frequently greater favourites) were balanced against each other in kajawahs; on arriving at the ground they helped to unload the camels;

the girls drew water, and the men grazed the camels; the women seldom scolded, and the men never, though they sometimes quarrelled and fought. The horses (or rather mares) are peculiarly fine, generally 15 hands high or upwards. Their arched crest, deep chests, and broad quarters were like those of English horses. Their heads are small and well set on, but the legs looked slight for the weight, though by all accounts they seldom fail; the mares are kept for breeding, but the horses are sold for high prices to Hindu Rajas. Order in these camps there is none. Sometimes we intended to make a long march, when half the number changed their minds and halted half way, but when near the Waziris they all agreed very well; the baggage kept in a tolerably close body, some horsemen were in front and some in rear; the young men, well armed, scoured the hills in search of hares and deer, answering also for flanking parties, yet a few robberies happened most unaccountably.

The trade of Khorassan is but little, about 4000 camel loads of the karbāz or coarse Multan cloth and India chints or Bahawalpur lungis, with a little sugar and spices, are all that come through the Gomal Pass, and I suspect this is about half the trade of the whole country. These imports are not all used in Khorassan, part is carried to Bokhara, the return being principally coin; and as the exports to India are merely fruit and a few horses, which do not equal the imports in value, the coin from Bokhara enables the balance to be paid in money. This is what I heard from the merchants, but I must confess they had a wish to deceive me if possible, as they suspected that inquiries would be followed by a tax. The productions of the country are few. The pastoral tribes merely make ghee, and sell wool, to procure grain for their own eating; and the settled Afghans only grow a surplus quantity of grain to barter for ghee, &c. The Tajiks are the most enlightened and civilised.

In Urghun and Kaniguram, iron is worked very well. The ore is broken to pieces and burned in a charcoal furnace which is kept heated by bellows made of whole goat-skins. The iron at last runs out in rough pigs. These are heated again and slowly cooled, when they are worked into horse-shoes, gun-barrels, and swords, with which all the eastern part of the country is supplied. Iron is abundant enough, but without coal, or much more wood than they have even in the Suliman range, they never can export it. Lead is found in the Hazara hills near Band-i-Sultan. Antimony in small quantities is procured at Tsirai near Ghwalari. On a plant, called by the Afghans red "tirkha," something very like the cochineal insect is found, and salep misri,* not so good as the Persian, is spread all over the hills near Killa-i-Bakshi. This small list includes, I think, all the principal produce of the country.

The late political changes are, I believe, favourable to Afghan trade. The country will perhaps be quieter, and the passes improved. The large

* Sa'labi misri, the root of a kind of orchis used as a restorative.—Ed.

China and Thibet trade, which goes through Tartary to the Volga and Nijni Novgorod (if the passes were rendered easier and safe, and a good understanding kept up at Bokhara and Kunduz), might easily be diverted to Kabul. The route being shorter, and our character for justice at least as high as that of the Russians, Kabul would then become the centre of the inland trade of Asia, for Indian goods could be easily sent through the passes.

Then the Afghans, possessed of a fine breed of camels, and themselves fond of a wandering life, might become the chief carriers of this large trade. But of any extensive traffic with the Afghans themselves I see no prospect for a long period. People to buy must have something to sell, and the Afghans have almost nothing. It will require many years of order and good government, and a total relinquishment of their pastoral habits, before they can enter this field. In a report made by me to the Military Board in April 1838, on a road in the Himalayas near Mussooree, I was led to remark the possibility of our securing this trade with Central Asia, by a good road, like that of the Simplon, made over one of the passes to Thibet; at that time there seemed no prospect of our commanding so finely situated a mart as Kabul, and I take this opportunity to renew the subject, when our circumstances are so much more favourable.

## Daman.

Daman is inhabited by Afghans and Jats; the latter are generally called Belochis, tradition stating that they fled from Belochistan a few hundred years ago; but their language, manner, and appearance are those of the Jats. I see no reason to give them a different name. Compared with the Afghans, they struck me as a slighter race, with limbs more rounded and voices not so deep. They cultivate the land belonging to the Afghans, who often furnish the seed and everything but the labour. They seldom carry arms, and if not positively oppressed are treated as an inferior race. With the climate of India they have most of its customs. They assemble in villages and towns round which are wide spaces of cultivation; near the hills many streams are used in irrigating the land. When these are expended, their only trust is in rain cultivation. The climate of Daman is very hot in summer, even more so than Hindustan, but it is colder in winter: snow indeed never falls, but ice is sometimes seen in the morning. Both the rains of India and the winter monsoon of Khorassan fall in Daman, and there are occasional showers during the year; yet the total rainfall is less than that of India, and very precarious. The rain cultivation, therefore, sometimes makes a man rich, at other times poor. Consequently the Afghans keep large flocks and herds, making themselves independent of the rains. Like Kutch Gandava, the hill streams overflow in spring and cover the country with a thin sheet of water, which slowly running

off, leaves a flat surface of clay; this is soon covered with a thin tamarisk jungle, and camel shrubs. The soil, a few feet under the surface, has generally a moist stratum, by digging in which, a small quantity of water oozes out; but if this is dug through, dry clay mixed with sand extends to a great depth. In some parts of India it seemed probable that water in horizontal sheets extended a long way beneath the surface. In Daman the few wells are of different depths, as if the water was not continuous, but in caverns; but whatever the cause be, wells are not used for irrigation, and are seldom dug.

The Dowlat Khel are a large tribe, of which the chief place is Tank; they and the Gandehpurs use the whole Gomal in irrigation. The senior family is the Katte Khel, the head of which, Sarwar Khan, established the power related by Mr. Elphinstone; but it was not without many skirmishes and many serious attacks, that he succeeded in levying a tax on the caravans passing Ghwalari. He died about six years ago, and his son Alladad ruled in his stead; but the son seems to have had neither abilities nor courage. In two years the Sikhs approached the walls of Tank, and though he had troops and even guns, he fled without a blow. The tribute had made him the enemy of the trading tribes, and his only resource was the Waziris. He lives, I think, at Urghun, and possesses some influence in the hills, while Tank is garrisoned by a few thousand Sikhs.

The Gandehpurs are a large tribe settled from near Manjigara to 10 miles east of Kulachi. The chief places are Kulachi and Luni; the first contains about 700 houses, with a good bazaar, and is surrounded by a low mud wall nearly a mile each way; the houses are very scattered, they are made with timber roofs covered with clay; the walls of mud. Luni is also a straggling place of about 400 houses and a good bazaar. The Gandehpurs have never made a figure in Daman, though always strong enough to defend themselves. Their chief, Ali Khan, is an enormously fat man, and very ignorant; his tribe represent him as harsh and oppressive.

The Miyan Khel inhabit the country for about 10 miles round Daraban; they use the Zirkani stream, which issues from Zawa, and is considerable in spring; this tribe has many Hamsāyas,* among others the Miyanis and the Bakhtiaris, the richest merchants of the country. The Miyan Khel is about equally divided into settled and migratory families.

The Sturianis to the south of the Miyan Khel, formerly went by the route of Wohwa (Vihova), but from some quarrel with the Kākars of the road, they now go round by Ghwalari and Kundar or by Zawa. They are similar to the Miyan Khel.

Exclusive of these tribes, partly migratory, the Nassirs are wholly so; and the Sarprekara Suliman Khels, a trading tribe, spend the

* Hamsāya means neighbour.—Ed.

winter in Daman. Near the hills there are always numbers of camps of the tribes driven by the snow to seek a warmer climate. Indeed, when it is recollected that the settled Ghilzis have every year to lay in four months' supplies for their cattle, or in some instances to send their sheep to the care of a friendly tribe in a warmer district, for which they pay a tax on their flocks, it may be easily conceived that many cannot afford to spend so much of the year in idleness, or have too many feuds to trust their sheep out of their sight. This shifting population has a prejudicial effect on Daman, as they are not reached by the law, and contribute nothing to the general support. When it was so easy under the Durani kings to evade the demands made on them in one country, till the climates allowed them to go to another, it is much easier still to do so, when they are subjects of Lahore and Kabul alternately every six months, and the difference of faith precludes all concert between the Governors of Daman and Khorassan.

The rule of the Sikhs is firm at Dera Ismail Khan; and around Tank, where there are garrisons; at a distance from the Indus it is nominal, and near the hills openly defied. The Sikhs have allowed idolatry, have forbidden the call to prayers, and have endeavoured to prevent the Afghans eating their own beef. The Saddozai Nawab of Dera is almost a prisoner. These measures, and the difference in religion, have rendered the Sikh rule odious to the tribes. When our army marched to Kandahar and Kabul, the Afghans held the Punjab to be virtually subdued, and refused to pay the taxes demanded. Now their eyes are opened to the consequences of their error, and they eagerly long for our rule. Every man whom I met asked eagerly when the province would be occupied. Several Miyani chiefs and the head of the Gandehpurs assured me they wished for it: and so general was the impression, that even Laki Mall, Governor of Dera Ismail Khan, gave more than hints that he was our friend. To all this I steadily replied that I knew of no wish to take the country from the Sikhs, who were our firm allies. Yet these disclaimers only made them give me credit for caution, without changing their opinion. Old prophecies (probably very lately made) declare that the British shall rule from China to Damascus, and the strange events of last year might easily mislead them. The Hindus are the shopkeepers and money-lenders of Daman, and among Musalmans have always one character—quiet, respectable, and a money-making race.

In my account of the hill tribes I see no mention is made of taxes. The reason is "they never paid any." Taimur Shah, when he had a strong force to back him, sent to the Kharotis to claim a tax; they showed a handful of pine nuts (chilgoza), and said that that was their food, and they could only give a tax of what they had; on this the subject was dropped; at present they are too poor to pay even for their own protection.

In my routes I had very little opportunity to examine strata or

collect specimens; but I may simply state that the principal rock I saw in the Hazara hills was carbonate of lime and other limestones. In the ills near Pannāh, clay slate shading into quartzy sandstone. In the lrān range, clay slate seemed dipping 45° to the east. Down the mal Pass clay slate predominated at the bottom of Ghwalari; on each e was conglomerate and clay slate at the top. From thence to the ins was an impure limestone with many specimens of nummulite, and a bivalve whose name I do not know.

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*2nd Lieutenant, Engineers.*

KARNAL *25th January*, 1840.

# JOURNEY

FROM

# SHIRAZ TO JASHK,

## VIÂ DARAB, FORG, AND MINAB.

By J. R. PREECE.

# JOURNEY FROM SHIRAZ TO JASHK,

## VIÂ DARAB, FORG, AND MINAB.

By J. R. Preece.

(Read at the Evening Meeting, January 5th, 1885.)

Map, p. 438.

I am told that some account of a journey which I lately made between Shiraz and Jashk, viâ Fassa, Darab, Forg, Bandar Abbas, and Minab will be of interest to the Society; I therefore forward a transcript of my journal, together with a route map, trusting that at least something in it may be found worthy of notice.

My departure was so extremely hurried that I had no time to collect the instruments necessary to make any accurate survey of the country.

I left Bushire on the 13th of January, 1884, arriving at Shiraz on the 20th, immediately setting to work to collect animals and information. I made a start on the 29th. The only instruments I had been able to procure were a prismatic compass and a pair of aneroid barometers.

I left Shiraz by the Ispahan gate, and taking a direction south-east, proceeded to the village of Jafferábád which I left next day and arrived at l'ul-i-Fassa, distance five miles.

The bridge here crosses a small stream, which runs into the salt lake some few miles further on; it rises in the marsh of Karabagh, some six miles to the westward. At present its waters are sweet, but as the season progresses they become brackish and undrinkable. The road from Jafferábád to the bridge ran through a perfectly level plain, marshy in places, with slight salt efflorescence here and there.

Left Pul-i-Fassa at 11.20; rode along a level plain skirting the outlying spurs of Maharlu, until a point of the hill projecting into the plain was reached (4½ miles); direction to this point was east, afterwards it took a south-east course; on the one hand the road ran very close to the hills, and on the other to the salt lake. At 1.38 P.M. (8 miles from the bridge) reached a second point, this is the one seen from Shiraz. The road for some distance continued near to the hills, but afterwards the plain opened out, the road following the line of the lake. About eight miles from the village of Maharlu, passed a place which is known as Dobeneh; there is no habitation, but several disused wells and a couple of trees, known as the *beneh*, a class of wild pistachio.

About five miles before reaching the village passed through ground

under cultivation which continued up to the village. Just before entering it there was a small stream of water, clear and sweet.

At 3.40 P.M. arrived at Maharlu; the village gives its name both to the lake and to the hills above it. There are fine bold limestone bluffs standing some 4000 feet above the plain of Shiraz. The village is in rather a tumble-down condition, built on each side of a dry water-course. The people seem civil and friendly. It consists of about 80 houses built of mud and stone, inhabited by some 350 people.*

*January 31st.*—Left at 8.15 A.M. For the first mile or two the road was somewhat stony; just outside the village crossed a small stream which seemed to be strongly impregnated with sulphur. Direction of road south-east. At 9.7 A.M., or after going 3½ miles, passed a village under the hills to the right, about two miles off, called Poaht-i-par, consisting of about 20 houses. Direction of road here somewhat more easterly. 9.33 A.M., passed a road on the right hand going to Kharanján, a village in the plain. Road now on a smooth plain bearing south-east again. 9.53 A.M., passed a village and garden quite close to the road, called Bukat, about 100 inhabitants. 10.8 A.M., passed level with end of the salt lake, and shortly came on to ground which much resembled the Bushire Masheelah, but not quite so bad; followed this until 11.45 A.M., then came on to a smooth plain with some little scrub. At 12.45 P.M., arrived at Khairábád, the road level and easy the whole way. The people of the village civil and quiet; the village consists of about twenty houses built of mud bricks, the whole surrounded by a high wall with towers at each corner; 100 inhabitants. 2.15 P.M., started again. The road led over easy country, covered with short brushwood (*butah*). 3.11 P.M., passed the small village of Kanao. All about this portion of the road the supply of water is good. 3.50 P.M., passed the village of Huseinábád. 4.25 P.M., Katah Gumbaz, a village of certain pretensions, was reached. There also there was good water. After leaving this village, came into country which was well cultivated, chiefly with tobacco; a small canal of running water ran close beside the road the whole way up to Sarvistán, where we arrived at 5.45 P.M. Distance from Maharlu, 25½ miles. The whole road is perfectly flat and easy going, being part of the Shiraz plain. To this point wheeled carts could be easily brought.

Sarvistán† is apparently a thriving place, consisting of about 300 houses, with a population of 1000 people. There are some 150 gardens, containing chiefly pomegranate and walnut trees; there are some few

* Malyát (taxes) 11,500 krans. 700 mans (1 man = 8 lbs.) of wheat and barley sown yearly; produce beyond that kept for home consumption is sent into Shiraz for sale. There are no mules, but about 1000 donkeys; 40 oxen kept for tillage, and some 2000 sheep are kept for food and produce. Distance from Shiraz 23¾ miles.

† It is divided into four parishes; 1500 mans of wheat and barley sown yearly; 2500 donkeys, no mules or camels, 52 oxen for tillage; malyát, 1500 tomans.

date-palms, but these do not bear fruit. The houses are mainly built of sun-dried bricks; *gatch* (plaster of Paris) is obtainable from the surrounding hills. The water is good. The temperature seems milder than Shiraz. The date-palms appear to grow better, and I noticed myrtle growing freely; I have never yet succeeded in keeping any in Shiraz through the winter.

*Feb.* 1*st.*—Left at 10.5 A.M., road bearing south-east, through a level plain, somewhat stony in places; after going 4½ miles came to a deep gully with a small stream of water at the bottom. The country between the road, which runs almost along the side of the Kuh-i-Siah, and the hill on the left is completely seamed with gullies and water-courses. A little pick and shovel work in places would make this portion of the road available for wheeled carriages. It is, however, the roughest part that we have as yet crossed; it is on the whole fairly level, and there are no abrupt ascents or descents. The hills are everywhere more or less wooded with wild almond and wild pistachio. After crossing the stream, for four miles the road passed through a sort of semi jungle of the above trees until reaching Meyán Jangal. This is but a ruined caravanserai in the middle of the plain, as its name indicates. A Tofanchi tower has been built out of the débris. Facing what was the doorway of the caravanserai, about 20 yards away, is an Imamzadeh. Distance from Sarvistán 16¼ miles.

*Feb.* 2*nd.*—Temperature at 8 A.M. 42°. It froze heavily during the night. Started at 8.3 A.M. The road ran through a level plain, dotted here and there with a few trees, for about three miles, then it entered some small hills and gradually ascending for 1¾ mile came on to a sort of plateau, when a small stream was crossed. The country now became more thickly wooded with wild almond and wild pistachio trees; the road was somewhat stony, winding in and out of small hills. The next 3½ miles was a gentle ascent to the top of a pass. The gradient very easy. The whole ascent was not so steep as that of the Kinar-i-Gird hills from the Teheran side. The whole road practicable for two-wheeled carts. Direction S.S.E.

About a mile beyond the top of the pass, came to a deserted and almost ruined caravanserai by the roadside. The aspect of the hills somewhat rounder than those previously seen; they were also more thickly wooded. Just behind the caravanserai was a good spring of water. The snow-line seems to be some 500 feet above this point.

After leaving the caravanserai the road gradually descended, skirting the bases of a series of low gravel hills, until it came out on the Fassa plain. It had been somewhat stony, but now became less so.

Fassa seems to be in a most flourishing condition; date-palms grow all over the place. The houses are well built and the streets somewhat cleaner than the generality of Persian towns. People all were most civil and obliging. Great quantities of wheat, barley, and opium grown.

There are no special industries in the place, the whole of the working population appear to be engaged in agriculture.

Temperature here much milder than that of Shiraz; as early as this one is able to sit with windows open during the day. Roses and hyacinths already in full bloom.

Distance from Meyán Jangal 17½ miles. Fassa is the name of the district as well as of the town. It is under the Kawam-ul-Mulk, who keeps a *naib* or lieutenant in the town. The population of town about 5000; 1000 houses; that of district from 35,000 to 40,000.*

*Feb. 4th.*—Left Fassa at 11 A.M. The road runs through a level plain of apparently rich alluvial soil, everywhere well cultivated with barley, wheat, and opium, and in some cases Indian corn. After going for half an hour (1¾ mile) passed the village of Nasirábád, Fedishkuh one mile, and Aliábád three miles away to the right. 12.25 P.M., passed Harun (five miles); shortly after leaving this village the road took a south-easterly direction, and the dry bed of a stream was crossed. Still keeping to the plain and through heavily cultivated ground, passed by the village Ghiyasábád. The road here getting somewhat more to the south, at 2.30 P.M. arrived at the village of Nabandágán. Distance 13 miles. Nabandágán is a large and prosperous walled village, almost worthy of the name of town; it contains 700 houses, with a population of 3500 people.† Carts could be brought here from Fassa without any difficulty; the village, however, is about half a mile from the main road, which runs along the base of some low hills nearly straight to Jelyán. Water is plentiful along the whole road. The plain has numerous villages dotted over it, and also a number of watch-towers, but the latter are falling into ruin.

The plain of Fassa is completely surrounded by hills. It is probably about 20 miles long east to west, and 12 broad north to south.

*Feb. 5th.*—Left at 9.35 A.M. For 3½ miles the road continued along the plain up to the village of Jelyán, which was passed on the right hand. After going another mile, rounding some low hills, the bed of a river about 80 yards across was passed; there was scarcely any water in

* The district comprises 31 villages, viz. Rownez-i-Bálá, Rownez-i-Pyne, Aliábád, Deh-i-Nau, Tengkerm, Katchaya, Akbarábád, Banyán-i-Kúshk, Kasr-i-Keram, Harun, Sarárud, Dashcheh, Feruzadmard, Sa'ádatábád, Muhammedábád, Fedishkoh, Zakadán, Senan, Kangán, Kharanján, Meyandeh, Nasirábád, Nabandagán, Ghiyásábád, Sheshdeh, Akbarábád-i-Sheshdeh, Darimy, Darakuhyeh, Daulatábád, Jelyán, Sheikhábád. At all these villages barley and wheat are sown in quantities of 100 to 1000 māns yearly. Great quantities of opium are also sown. Fassa opium is perhaps the best of any produced in Persia. Labourers' wages range between 15 shahies and 1 kran (4*d.* to 8*d.*) per diem. Provisions of all sorts are very plentiful; water is good and in fair quantity, chiefly brought into the plain by *kanāts*. The gardens about the town and villages are filled with fruit trees of all descriptions. The date-palm here bears fruit. Malyát 180,000 krans per annum.

† 3000 māns of wheat and barley and 500 māns of poppy seed are sown yearly. The village owns 88 oxen for tillage, 4000 sheep and 4000 donkeys; no mules.

it, even at this time of the year. Shortly afterwards (three-quarters of a mile) we came to a fair stream, crossed by a very primitive sort of bridge; three-quarters of a mile farther on, and the village of Mordi was reached. The stream ran by the side of the road the whole way, and is known by the same name as the village. The village only contains 50 houses, 150 people; 2000 māns wheat and barley and 70 māns of poppy seed are sown yearly, also some Indian corn; 20 oxen and 600 sheep are owned by the village, but no donkeys or mules.

After going another two miles along the base of some low hills, we entered a somewhat narrow *tang* (defile), the road here was rather stony; the tang extended for about a mile, the hills on the left side being somewhat precipitous for the last half mile, those on the right sloping and broken.

Along the sides of the tang I noticed the remains of an aqueduct generally built up of stone and mortar but in some places cut out of the rock. This is said to have been built and carried along the sides of the hills right down into the plain of Darab, to supply that place and Hassanábád with water. I could not learn about what time it was supposed to have been built.

Having passed through the tang we came out on the plain of Sheshdeh; an easy ride of three miles along a level and good road brought us to the village of that name. Distance 12 miles. Sheshdeh* is a large and prosperous place, but the people appear to be inclined to be rude and uncivil, differing from the other villagers we have come across in this respect.

*Feb. 6th.*—Left at 8.30 A.M. The road from the village of Sheshdeh to that of Akbarábád took a course nearly due east. The latter village was reached at 9.15 A.M. (2½ miles), it then diverged to south-east until the Kálah Karabulagh was reached at 11.23 A.M. (7 miles). This is a sort of rallying place of the black tents; it consists of a large tower in the centre, surrounded by four high walls flanked by towers; in the space between the centre tower and the walls are one or two wells of good water. It belongs to the Kawam-ul-Mulk. When we passed there were in or about it, 400 tents, 2000 people, owning 50 span of oxen, 5000 sheep, and 200 donkeys. 700 māns of wheat and barley are sown yearly.

The plain has numerous watercourses, some dry, some with running water. We also noticed numbers of wells about this portion of it. The soil of the plain appears to be exceptionally good, richer than any previously noticed in Persia, nearly approaching that of the black earth zone of Southern Russia.

Left the Kálah at 12.40 P.M., and at 1.19 P.M. passed a small open

* The village contains 200 houses, 700 people; 6000 māns of wheat and barley. 80 māns of poppy seed are sown yearly. The villagers possess 60 oxen, 1500 sheep and 50 donkeys, but no mules.

village called Tangábád. This may be considered to be at the entrance of the defile, called Tang-i-Bulaghy. From this point the hills closed in rapidly. 2.5 P.M., arrived at the village of Darakuyeh. Distance 13 miles. The village is but a small one and somewhat dilapidated.*

*Feb. 7th.*—Left at 8.7 A.M. Before reaching the top of a small *kotal* (pass) the road passed through some low hills and over somewhat stony ground. The pass took nine minutes to walk down and four to walk up the other side. It was a deep ravine which evidently carried off the drainage of the hills and plain down into the Darab plain. The road then followed the side of the hills on the left hand for half a mile, then a short turn to the S.S.E. of a quarter of a mile brought it to the top of the descent into the Darab plain. Twenty-one minutes' walking down an easy, but in places somewhat rocky, descent, brought one into the plain.

This portion of the road would present some difficulties to wheeled vehicles, but a little work would soon make it practicable, except at the small kotal, where they would have to be unloaded, or if it were necessary, the ravine, I think, could easily be crossed by a light bridge.

Close to the foot of the descent into the Darab plain we passed two conduits built of stone and mortar. These are said to have been built in connection with the aqueduct previously referred to. 10.50 A.M., passed village of Hassanábád, and at 11 stopped near a small Imamzadeh. Distance 9½ miles.

The plain about here is covered with fine well-grown konar trees, and also with clumps of still finer myrtles. The soil appears to be fine alluvial, giving crops of great richness. The plain well watered by numerous small streams of good water. Many villages and gardens in every direction, also many camps of Eeliauts. The hills on the left hand, along the bases of which the road runs, are very fine indeed, presenting to the eye a succession of rugged crags with perpendicular sides. They show much more character than is usual in Persia. For the most part they appear to be pure limestone.

Left at 12.12 P.M. Rode along a road at times slightly stony, near to the base of the hills. At 1.25, crossed the Chashma Gulabi, a fine spring which issues from the base of the hill; the water was beautifully clear and limpid, the excess forms a small stream which runs off into the plain and makes a marsh of some size. 1.47 P.M., passed a hill which appeared to consist of nothing but salt. It is called Kuh-i-Nimuk. The many various colours, together with its numerous sharp pinnacles, standing out against the dark background formed by the hills behind, made it a very remarkable object in the landscape. 2.5 P.M., passed another fair stream. 2.40, passed the village of Bakhtijird on the right about a mile in the plain. 3.20, came in sight of the Kálah Darab, a garden

* It contains 100 houses, 300 people, 8 span of oxen, 400 sheep, 50 donkeys; malyát, 1500 krans; 1500 mans of wheat and barley sown yearly.

above the town under the Kuh-i-Ma'adan. Soon afterwards, passing between two small hills, came on to the town, where we arrived at 4.30, and got to the above Kálah, passing first through the whole length of the town, at 4.45 P.M. Distance 24 miles. The garden is full of date, orange, lemon, and rose trees. Owing to the mild temperature of the place, lemons are to be found on the trees ripening all the year round. From the foot of the pass the country again admits of wheeled carriages being used.

The hill above the town is called Kuh-i-Ma'adan because of the number of mines in it. It is said that copper, iron, and silver are all to be found here. None are being worked at the present time, nor have they been for a great number of years.

As the traveller descends into the Darab plain from the west he cannot help noticing a small isolated hill with two peaks; when one approaches it, you perceive that it has been once surrounded by a high wall. This place is known as the Kálah Darab. Tradition has it that it was built by Darab, the king of Persia known by us as Darius Codomanus, in all probability. I have not been able to trace this, however, in any of the Persian geographers.

The town of Darab, or rather Darabjird, as it should be written, is not so well built as Fassa. The houses are mostly built of mud and stones; very few of kiln-burnt bricks were to be seen. The main street is long and straggling, and there is not a proper bazaar; but owing to the gardens which are numerous and apparently thriving, it appears to cover a large tract of ground. The date-palm flourishes here, so also do apricots, peach, plum, almond, and pistachio trees, and on the hillside grape-vines.

The town proper contains 1000 houses, with a population of 6000.*

*Feb. 10th.*—Went to the Kálah Darab, found it to be a large circular

* Malyát, 24,000 tomans, 400 donkeys, 4000 sheep; provisions of all kinds plentiful. The following are the villages of the district of Darabjird :—

| | | |
|---|---|---|
| Dobarún. | Rahéinábád. | Harbadán. |
| Dabírán. | Maryán. | Kaláhno. |
| Meyanshakh. | Dashtiband. | Kalmadán. |
| Seyahán. | Zarkarán. | Mobarrakábád. |
| Saráb. | Bakhtajird. | Dobán. |
| Jamsy. | Nasrhún. | Baháderán. |
| Ghiásy. | Hassanúbád. | Marbúyeh. |
| Khasoyeh. | Tájábád. | Sachún. |
| Barfdáu. | Fathúbád. | Layzangán. |
| Jevanán. | Nakelán. | Dangán. |
| Beyádeh. | Kazimábád. | Hassanábád. |
| Bezdán. | Shahiján. | Shamsábád. |
| Tezáb. | Hashiwár. | Shahnán. |
| Jazján. | Daulatábád. | Fezábád. |
| Madowán. | Kuhjird. | Konán. |
| Meyándeh. | Zeráb. | Khalulábád. |
| Deh Khayr. | Ram. | |

enclosure of about a mile in diameter. The walls, which evidently were simply mounds dug out of the plain and thrown up, leaving on the outside a ditch of about 40 feet broad, must have been at least 20 feet high. Within the enclosure, as near as possible in the middle, are two small rocky hills; on one, the higher and southernmost, standing about 100 feet above the plain, there are the remains of some buildings and also a well. The building is, so to speak, modern, built of unfaced stone and mortar. At one point there are the remains of a brick building, but the bricks used are of the modern size. Running straight from this hill to what undoubtedly was a gate, are the remains of an aqueduct; beyond the walls some of it, supported on arches, still remains; the style of building and materials is similar to that on the top of the hill. Around the base of the hill and all about inside the walls are numerous small mounds, but none of sufficient size to cover the ruins of an Achæmenian palace of even minor importance. After searching the whole place most carefully and examining the rocks all about, not the slightest trace of a stonemason's handiwork could be found, the rocks show no sign of ever having been touched. All about the enclosure were numerous pieces of brick, some of the size now used, others considerably larger. Pieces of tiling were also occasionally to be picked up. The place did not give one the idea of any great antiquity. It doubtless belongs to the Sassanian period and not to the Achæmenian as we surmised and hoped.

*Feb.* 11*th*.—Left at 10.30 A.M., went round the hills to the south to see what is known as the Naksh-i-Darab. After riding for an hour and a quarter round the base of the hills we reached the place.

In a sort of bay of the hills, above a very fine clear pool of water, a piece of rock has been squared away, measuring some 12 to 14 feet in length by nine feet in height. On this a fine bas-relief has been carved. In the centre is a figure, life-sized, seated on a somewhat small horse. It has the large globular head-dress and bunch of curly hair, rendered familiar to us in the various other bas-reliefs at Shapur, Nakshi Rustam, Nakshi Rejib, and on the coins of the various Sassanian kings. The figure faces to the right, its left hand is advanced and rests lightly on the head of a man, its right hand is advanced and seemingly holds a sort of short truncheon. A collar of pearls is around the neck, and the cloak flowing behind is fastened with a double clasp. The breeches also are very full and flowing. The horse is heavily caparisoned, the large horsehair ornament attached to the saddle cloth is especially conspicuous. As far as the horse and rider are concerned, this bas-relief resembles very closely that at Nakshi Rejib (*vide* Porter's Travels, plate 28).

In front, just by the horse's head, is a figure of a man in Roman dress, with a Roman sword; he is holding up his hands pleadingly. Next to this figure is that apparently of a woman, it is slightly to the

left front of the horse's head. Next to this comes the figure of a man, upon whose head the left hand of the mounted figure rests. She looks beseechingly up into the face of the main figure, holding his right hand up to the heavens. The face is clean shaved, except a fringe round the cheeks and under the chin; the hair of the head is close cropped. Behind him, going up to the top of the Naksh, are twenty-three heads, some with part of the shoulders and breast visible; these are somewhat crowded together. The drapery over their shoulders is something like that of a monk, especially in the case of the first of these figures. Behind the horseman is a group of soldiers, in four tiers of three each, mounting to the top and filling up the left-hand side of the Naksh. They have all high rounded hats, flowing moustaches and curly long beards; their hands rest on the hilts of their swords, which are straight. Their dress comes down nearly to the knee, the trowsers are somewhat full, round their ankles are straps with buckles. Under the horse's feet is a dead man. In the right-hand lower corner is the figure of a horse, smaller than that on which the main figure is mounted; it has a hogged mane; between its legs is a circle with spokes probably meant to represent a chariot wheel. The whole bas-relief is exceedingly well cut and in very good preservation, all the faces except that of the central figure having escaped the iconoclastic hands of the Mahommedans.

About an hour's ride, further on along the same hills, having many beautiful springs, brought us to the place known as the Caravanserai. In a somewhat larger bay in the hills a place has been cut out of the live rock; the stone quarried out has been used for building up portions of this place and for part of the roof. Nothing similar to this building has ever been noticed by me in Persia.

It may have been used as a mosque, a house or caravanserai. It is in the shape of a cross, the doorway facing nearly due south, the whole cross almost coincident with the four points of the compass. The length 26 yards, and breadth 23 yards; width of centre aisle 5½ yards, width of cross aisle 4 yards. In the centre there is therefore a space 5½ yards by 4 yards, this rises straight up to a height of 22 to 25 feet; it is now uncovered, but originally was closed by one big stone. From about nine feet above the ground arches spring up to the height of about six feet, thence to the opening it is square. On each side of both the aisles there are two small arches, which lead to a small gallery about four feet high, going all around the place, except at the end of the aisle facing the east. There there is a place which at first looks like an old English fire-place, but it has no outlet for smoke, and does not show signs of having ever been used for fire. Around the top of this is a stone ornamentation with carving, the stone is whiter and softer than that of the building. The carving, which is about 10 inches broad, consists of some writing in the Naksh characters. On half the top and the right-

hand side the carving was completely obliterated, but on the remainder the words Muhammud, Hassan, Fatma, and Amir-ul-Mumenin were to be distinguished. On a sort of frieze inside there was similar carving, but this was quite undiscernible. Over the main doorway and on each side of it, there is also an inscription in the same character, of this only the word Muhammud could be read. The stone on which this is carved is that of the rock, a dark stone and apparently very hard.

About twenty paces from the entrance of this building is a small archway which leads into an arched room about 15 feet long by 10 broad. This has been cut very neatly out of the rock. All the stone of the main building is clean cut and faced. At the spring of one of the arches there is some slight attempt at ornamentation. Nowhere could I discover writing of any sort other than that referred to above.

About 200 yards away in a second bay of the hills, and somewhat behind the caravanserai, is a chamber roughly cut out of the rock, or it may be a natural cave. This has been used as a mill; a watercourse has been led down from the hill immediately above it to two large deep cisterns some 20 feet deep by 8 in diameter. The surplus water was led off by a course built along the hillside; it could be traced winding away along the base of the hills for some two miles, and we were informed that originally it went as far as Dehkhayr, seven miles distant. Above the entrance to this cave was a Naksh inscription of the same size as that over the doorway of the church, but only a letter or two here and there could be made out.

The style of the building, the stone being properly faced and set square, points to its being the work of other hands than Arab or Persian. I have had no opportunity of consulting any books on this part of the country, and I do not even know if either bas-relief or building have even been described.

All about the foot of the hills and for some two or three miles in the plain, there are small mounds and traces of habitations, pointing to the fact that once a large town existed here. Careful search among the hills failed to reveal any inscription which would throw any light on the subject.

Dehkhayr is a prosperous place, with many gardens, and also some signs about that once it had been a big place. Passed in the plain several remains of the watercourse above referred to. The village contains 200 houses and 500 inhabitants. Distance 10 miles.

*Feb. 12th.*—Left at 7.53 A.M. The road ran through a level plain for about seven miles. When about a quarter of a mile to the left the village of Fathábád was passed. Almost directly after it entered between some low hills, outside of which numerous low mounds, also evidences of former buildings, were noticed. At the immediate entrance to the hills there were the ruins of a large mill. After following for a mile or so the dry bed of a stream, again came out on to the plain.

The southern hills here began to converge rapidly, and the plain, which before was very open, narrowed considerably. After going seven miles came to some low hills, spurs of the above, and descending by an easy gradient between two of them, came into a narrow valley, with a small village in its centre, called Chahardang. Leaving this on the left and following the valley for a mile, crossed over a small hill. After going for another hour got to the village of Rosak. Distance 28 miles. The village is very picturesquely situated. The hills to the north are high and bold; those to the south, whilst of inferior height and much broken up, some with a considerable amount of scrub, have abrupt sides and sharp bold peaks. In the valley itself clumps of myrtle with several large isolated konar trees aided the picture, whilst a good deal of cultivation, with a fair stream of clear water running through the centre, completed it. In no place was the road impassable to wheeled carts, nor is there a difficult place about it. The village contained 100 houses and 300 inhabitants.

*Feb.* 13*th.*—From Rosak to Forg there are two roads, one by a *gardeneh*, which I was told was four farsakhs, and one by a tang, five farsakhs. I was told that the latter was the easier, and was more or less level the whole way, but that it was full of turns. I travelled by the shorter road, leaving Rosak at 8.7 A.M. For the first five miles the road ran through the level valley, the country gradually becoming very confined. At 10 o'clock, or after going six miles, began to ascend gradually over a very stony road, and at 10.30 came to the head of the gardeneh, called the Gardeneh Bezan-i-Forg. The ascent is very gradual, but the road is rocky and bad. Near the top I saw buried in the ground some khumerahs to collect water, similar to those that Chardin describes as having seen between Lar and Bandar Abbas. These are the first that I have ever come across. About 100 yards farther on was a small tank; here we breakfasted. The tank was in bad repair, and the khumerahs broken, no one seeming to care to repair them. The khumerahs must have been in this place a long time, as they appear to be very old. The guide said that they had only lately been discovered.

11.45.—Started again; road all down-hill, a long but not very steep descent, somewhat stony. At 1.5 P.M. reached the plain, and an easy hour's ride took us to Forg. The village of Forg is square, surrounded by mud walls with flanking towers, a gate, also with flanking towers, at its east and west faces. The houses are all built of mud or else sun-dried bricks. The place is in anything but a prosperous condition. The people, however, were very civil and obliging. Water seems very plentiful, several small but good streams running through the streets. Provisions also were in abundance and cheap. Distance 14 miles. Forg contains but 100 houses and 500 inhabitants, 40 span of oxen, cows for milk 300, sheep 300, no donkeys or mules.

In conversation with the chief, Fath Ali Khan, a powerful man,

who has all this district, including Lar, under him (he pays yearly over 1,000,000 krans malyát to Government), I read out to him the names on the map between this and Lar. He did not recognise one of them, and gave me the following as being the correct stations between the two places:—

| | | |
|---|---|---|
| Chahnahr | .. .. .. .. | 4 farsakhs. |
| Feduny | .. .. .. .. | 3 „ |
| Barkam | .. .. .. .. | 5 „ |
| Shahgheb | .. .. .. .. | 3 „ |
| Tunginuyeh | .. .. .. .. | 5 „ |
| Hahueh | .. .. .. .. | 2 „ |
| Lar .. | .. .. .. .. .. | 2 „ |

*Feb. 16th.*—Left at 7.30 A.M. After going three miles came to a hill on the right, on which were the remains of a ruined castle, and at the foot of it a number of mounds and other signs of a town. The place is known as the Kálah Bahman.

The hill is some 180 feet high, and together with the ruins about its foot, covers a considerable amount of ground. All over the hill facing the east are ruins of towers and walls, built of rough unhewn stones and lime. To the left it is quite precipitous, and is only guarded by a wall, which follows the line of the crest from the flanking walls. This wall is terminated at its southern end by a large tower. Just below it is a large and deep chasm; this was in all probability a well. Near it is an excavation in the rock and hillside, built up with stones and mortar where it was necessary, 18 yards by seven; this was a large tank. In front of this, again, is a small conical hill, upon which was a small house of four rooms; the front one looking east being 21 feet long by 10 wide, and the three back ones about 10 feet square. Around the foot of the hill are the remains of a wall of stone and mortar, similar to that on it; beyond this wall again, but starting from the same point at the northern end of the hill, is a wall which encircles the whole base of the hill at a distance of some 400 yards; it rejoins the defences of the hill at a bastion on a spur at the southern end. In this enclosed space are many mounds of various sizes, and one larger than the others apparently has had a wall of its own to protect it.

On the hill-top at the southernmost point is a platform with a well beyond, outside of the wall; near to this is a small tank, with remains of a small room still standing.

The place at the foot of the hill, which seemingly has once been surrounded by a wall, is now known as the Humm-am. Remains of pillars of gatch and brick still exist; it is built on a slight elevation, and the surrounding wall is built of stone and gatch. In all probability this was the principal building in the place, as immediately in front of it there is a tank, and beyond that the gateway in the outer wall. This outer wall was also built of stone and mortar; the gateway has either

had an advanced fort to protect it, or else the mounds around it are the remains of the besiegers' works.

Some little distance in the plain, about 500 yards from the gateway, are three circular piles of large white stones; in the centre of each circle is a small round hole. Tradition has it that from this point the besiegers commenced their mining operations, and so worked their way to within the inner fortifications.

Near to the hill, and running from the spur to the right, are the remains of an aqueduct; quite close to this is a second one in good condition, with water in it. It crosses the roadway by means of a series of archways, of fair span, and well constructed. It is as good a piece of work as I have seen in the country. I imagine that the fort and remains belong to the Sassanian period, if not even later; they are of the same class of work as the Kálah Darab.

10.45 A.M., again started on the road which ran for 2¾ miles across a level plain. It then entered some low hills, and soon got into an intricate mass of ravines and gullies, about as ugly a piece of country as I have ever seen, even in this country of excessive ugliness. After going through this for an hour, we got into a narrow defile between two long low hills. The whole place seemed as if the earth had been placed in a colossal furnace, and then been thrown out anyhow by the spade of a Cyclops. The defile took an hour and three-quarters to get through; it was very narrow, with scarcely room in some places for two horses to pass. The hills on each side were not more than 80 to 100 feet high, with jagged tops. Another half hour's rough going over and around hills, and up and down ravines, and we came out on a small level plain. It took just an hour to cross it; we then crossed over the slope at the bottom of some hills, this was cut up in every direction by watercourses, and apparently, by the number of round stones about, at certain times must be swept by floods. Another hour's ride brought us to Taskát, which is a village some three miles off the main road. The place is very dilapidated, with no good roads; it has, however, a very fine date-grove. Distance 19¼ miles.

I hear that there is another road from Forg, somewhat to the south of the one I came, the guide having brought me this way, as it was the shorter. The two roads bifurcate at the entrance to the hills. The southern one is level, and not stony. It is, however, about a farsakh longer. By the road I came it would be nearly impossible to take wheeled carts.

*Feb.* 17*th.*—Left at 7.25 A.M. The road was only a track across the plain, which was covered with low scrub; after going two miles we came to some low hills and passing through them for half a mile, came out into the Dasht-i-Tashkurd, a long level plain, about 50 miles in length and some 15 miles broad, I should say. At the far end (N.N.W.) is the Balook-i-Fardany. Seven miles off, somewhat more northerly, is the

village of Dasht-i-Konár. Opposite, nearly due south, a long range of hills called Galugah. This range seemed to bound the southern side of the plain for its whole length. We followed the plain along the base of some low hills on the left hand until 2.30 P.M. Distance 19 miles.

The plain is covered in nearly every direction with salt efflorescence; carts could be used without difficulty except during rainy weather.

Just before turning to the north of east, around a point of the hills, we came to the direct road to Forg. After passing this point, the plain opened out to the north; going then for seven miles farther we came to Seyud Jaudar, a poorish village with a good date-grove. There were no provisions of any sort to be got. The water, however, was good, and there seemed plenty of it—a small stream from the hills.

*Feb.* 18*th.*—Left at 7.25 A.M., across the same plain, quite level, with a great deal of salt incrustations about. After riding for an hour, passed the small village of Rafeeabad, with the village of Karkím about two miles to the north-east; date topes were to be seen in every direction. At 9.10 A.M. passed the road from Tarun to Lar. 9.54, came on to the direct road from Forg to Bandar Abbas. This, however, has no villages in it, and seems only to be used by Eeliauts. 10.22 A.M., crossed a small stream; at 10.35 passed a larger branch of the same river, both quite salt, the latter about 10 feet wide with a depth of six or seven inches. At 11.48 arrived at village of Sa'ádatábád. Distance 13½ miles. The plain is all more or less salt, very soft, and after heavy rains would be heavy travelling indeed. It is cut up by several watercourses. The people tell me that they have had no rain here for eighteen months. I imagine this must be taken to mean that they have had no heavy prolonged rains, as I noticed signs of somewhat recent showers.

The Kálah of Sa'ádatábád is completely in ruins, the people all living in date huts. There is a very fine stream of water running through the place. The latter part of the plain, within some two miles of the village, is covered with a sort of jungle of gez trees.

*Feb.* 19*th.*—Left at 6.30 A.M. The road for the first two miles was somewhat up-hill and slightly stony. It then entered the Tang-i-Lamby, winding about for some twenty minutes among low hills, and then came out on a small plain, about six miles long by four wide. The tang in no place was difficult travelling, in some places it was rather stony, but otherwise the road was good.

At the end of the plain, the road made a short sharp descent into the dry bed of a river, and then upon mounting the other side immediately entered the Tang-i-zagh; this is a difficult place, the windings of the defile are very considerable; the hills on each side are often nearly perpendicular, exhibiting at times most wonderful colouring and queer shapes; Nature has used her paint-box with a liberal hand, and formed such a picture as would delight an artist's eye. The sides of the hills were of deepest purple, streaked with, or fading away into tinges of the

most delicate violet or mauve; some with sides of rose with deep bold splashes of black or bluish-green; others of a tawny yellow striped with a bronze-brown. It is not one individual hill by itself that is so extraordinary, but the way they are grouped, and the contrasts of colour which make up this wonderful picture, unequalled by anything that I have seen either in Persia or the Caucasus.

After getting through the defile, the road bent to the south-west and gradually ascended, highest point reached by aneroid 26·30, then gradually descending, it entered the dry bed of a river, and following this for some five miles passed the village of Abmáh, about a mile to the left. The plain on the right and right front was somewhat curious, broken up into a series of little hills with flat tops and somewhat abrupt sides, as if once the whole plain had been a lake, and the waters in subsiding had cut valleys and gullies in the plain. The sections showed about 10 to 15 feet of gravel above a bluish-grey clay.

For some way the road ran between highish hills, and no distant view was to be got. The whole of the latter part of the way was stony and was by far the worst travelling I had yet experienced. It would be difficult to get vehicles through either pass or over some parts of these river beds, but not by any means an impossibility; a very little labour would render the whole route quite practicable. 5.40 P.M., arrived at Gohrah. Distance 29 miles.

The hills hereabouts are more like mud-heaps than hills. Many flourishing date topes about. This place and the last, Sa'ádatábád, seems to be on the high road to Yezd, a great number of camel caravans have been passed going to and coming from that place. Gohrah has no proper village or houses, but opposite to a Tofanchi tower, which is in partial ruins, we put up in a good-sized room made of sun-dried bricks. The houses or huts of date-palm leaves are erected all over the place under the date-trees, which are very numerous. There are 350 such huts, inhabited by 700 people. The water is good all the year round; there are two good wells on a hill near. This hill is called Musht-i-Kuh, here the villagers have built themselves a Kálah, and when occasion arises they take refuge there; there is only one road up to it. The hill appears to be 1000 to 1200 feet high and has a square flat top. The base is some 12 miles in circumference. The Kálah is never left unguarded.

*Feb. 20th.*—Left at 12.10 P.M., went along a stony road, passing about 1½ mile from the end of the date-trees two *abambars* (water-tanks covered over), which soon dropped down into the usual dry watercourse. Followed this for some four miles; it is known as the Chin-i-Tul. Then went over something in the shape of a gardeneh or rather a long slope from the hill on the right, Kuh-i-Zuratu, much cut up by watercourses, and then led down to the little village of Zuratu, a small place nestling under the hill. This was about the best camping place we had had:

nice patches of green turf under fine date-trees, with a good spring of fresh water rushing from the hillside. This spring continues good all through the year. Although the road now is not available for vehicles owing to the numerous deep watercourses which intersect it, yet a little work would soon make it fairly practicable. Distance seven miles. Zuratu has seven houses and 30 people.

*Feb.* 21*st.*—Left at 8.10 A.M. Followed the Chin-i-Zuratu till 8.45, when the road dropped into a dry river bed, and then came on to the Bir-i-Buland, direction nearly due south. The road fairly open and broad, but here and there somewhat stony, with some slight gradients. At 9.32 came to a small open plain called Barak. At 10.5 the direction took a westerly bearing, and a small gardeneh called Godar-i-Sowaro was crossed; it then worked in and out of some small hills, and at 10.45 again dropped into the river bed; here there was some water in it, and it is known as the Ab-i-Shireen. At 10.55 stopped to breakfast. 11.55, off again. 12.2 P.M., road was still among the same line of small hills, but working towards the east. 12.31 P.M., came out into the plain called Sahrá-i-Dardam. Road now nearly due west; after going for about five miles through this plain covered with mimosa, acacia, and wild almond, arrived at the village of Sarzeh.* Water from wells and also a spring from a hill close to, but this, although sweet and plentiful now, gets very brackish in summer.

It appears that from Gohrah to here, there is another road viâ Finn, which is about four farsakhs (14 miles) away from here in a N.N.W. direction. The road by which we came, although so roundabout, is really the shorter. Distance 17 miles. In the river bed I noticed that the oleanders were in flower, and near Zuratu I picked up a wild water-melon.

*Feb.* 22*nd.*—On Kuh Furkún snow has fallen heavily, and it is somewhat low down on the hillside. I should judge that this hill must be at least 12,000 feet high by the position of the snow in such a low latitude.

*Feb.* 23*rd.*—Left at 7.30 A.M. The road crossed the bed of the Abi-i-Shireen and then working nearly due south for some two miles among small hills and broken ground, bore away to the south-east, again crossing the river bed, and through a plain similar to the Sahrá-i-Dardam; it was open going and only here and there stony. Camped for breakfast near to the junction of the Ab-i-Shireen and Rudkhaneh-i-Shur. Close to this place is also the junction of a road with the one on which we were going; on inquiry I learnt that this is a donkey and foot road to Ganao, which branches off from the main road nearly at the

* Sarzeh, 20 houses, 100 people; 700 mâns of wheat and barley sown yearly; 8 oxen, 150 sheep. Rezwan, Bar, and Geru, three villages under one head—200 houses, 700 people; 60 oxen, 2000 sheep; 4000 mâns of wheat and barley sown yearly; 600 tomans malyát.

entrance to the Sahrá-i-Dardam and shortens very considerably the road from Zuratu. As far as I could see, it would not be difficult and would decrease the total distance by about ten miles. At this point there was no water in the Ab-i-Shireen but the Rudkhaneh-i-Shur has a small rapid stream which flows from the Kuh-i-Nimūk.

Left again at 12.13 P.M., following the same plain as in the morning; it is called the Dasht-i-Mohdam; this plain runs parallel to and at the back of the Ganao hills which are immediately behind Bandar Abbas. At 12.29 got nearly due south-east, and at 1.5 P.M. level with the village of Ganao, about five miles to the right in the hills, with a fine grove of date-trees at the foot of the ascent. On the plain and near to the road was an ābambar with a few date-palm huts, which were inhabited by the Rahdarees. At 2.25 P.M. camped. This is a high table-land, a spur of the Ganao hills on our right.

*Feb. 24th.*—Left at 8 A.M. and gradually descending an even slope more or less stony and cut up here and there by watercourses, at last came to the usual dry bed of a river; followed this for something over a quarter of an hour, and then got out into a plain with Chah Aly and Issin on our right front. Halted at Hormudar,* where we were met by men from the Governor. Distance eight miles.

Leaving Hormudar, immediately dropped into the wide bed of river with high sandstone cliffs on each side. This we followed for twenty minutes and then ascending the cliffs to the right by a sharp short pass got into a lot of curious sandstone hills cut up in every direction into eccentric forms and peaks, by the effects of running water. Following along a road in the plateau of sandstone, which was really nothing but a series of narrow troughs cut by the innumerable feet of donkeys and assisted by rain, for over an hour, and then descending quickly came on to the sands which surround Bandar Abbas. It rained almost the whole time and the clouds were both thick and low, so no distant view was to be got. Distance 16 miles.

The people everywhere have been most civil and obliging, all doing their utmost to help one. Their politeness, from Shiraz to here, has been extreme, scarcely a person met on the road failed to give the salaam. I cannot help saying that I have been most agreeably surprised all the way along.

*March 1st.*—Left Bandar Abbas at 9.5 A.M. by the same road as on entering. Arrived at the Birkeh at 4.15 P.M. A number of people

* Hormudar, 20 houses, 60 people, 3000 date-palms, no mules or donkeys. Issin, 100 houses, 400 people, 6000 date-palms; malyát of both 500 tomans. Bandar Abbas, 500 houses of sun-dried bricks, 9000 people; 200 date-palm huts, 2000 people; malyát of Mināb, Shamilat, Kishm, Beyarbān, and Tasiun, 24,000 tomans per annum. The customs are let for 45,000 tomans per annum. Gatch is brought by sea from Bandar Kamir. Labourers' pay, 10 shahis per diem. Sun-dried bricks, 2 krans per 1000.

were sent out with us by the Governor and Foreign Agent. They are a curious set of men, armed with matchlocks, swords, knives, and shields. They might have been of some use fifty years ago, but now, except to put in the foreground of a picture, they are not worth much. One gentleman is very gorgeous with silver mountings to his paraphernalia. They rode on camels, horses, and donkeys, and altogether form a nondescript-looking crowd.

The name of the river bed which we pass through between Bandar Abbas and Hormudar is Rudkhaneh Chahchekor.

*March 2nd.*— Left at 6.25 A.M. The road went on the same track as we came by, for something less than a mile, and then bore away to the right N.N.E. It gradually led down into the plain through which we had come from Sarzeh, and continuing through this crossed the Rudkhaneh-i-Shur. At 8 A.M. came level with where the river had cut its way through some low hills. The plain about here is very stony, but here and there are patches of good ground which have been cultivated; the crops, owing to the scarcity of rain, are only now beginning to show up. The plain is much cut up by streams, especially by the main branch of the Shurāb, which covers a lot of ground when in flood. After going about 7½ miles came to the Sahra Kunuk, really a part of the same plain; at 9.32 A.M., or after going 11 miles, descend a deep gully, at the bottom of which was a salt stream, another Shurāb. At 10 A.M. the road bore away to the south-east, crossing a sort of plateau, with a gentle descent; at the foot another river bed was passed, this also covered a fair quantity of ground, which, as far as one could judge, had lately all been under water. With the exception of these streams and the ground affected by their floods, the track—it is impossible to call it a road—is fairly good, although in places stony. At 11.5 arrived at Kálah-i-Kazi or, as it is more generally known, Kalgazi. This village has a fine grove of date-trees, and there are also numbers of fine grown mimosa dotted about; these among the young growing crops give a park-like look to the surrounding country, and a picturesqueness to the villages. The place seems in a very flourishing condition, and the people are very civil.

The villagers do not seem to burden themselves with much clothing in these parts. The men's dress seems to consist of a shirt and a rag; these they manipulate in a very clever manner, altering them a dozen times in the day to suit the state of the weather: the rag appears to act the part of a turban, a cloak, a cummerband, or a pair of trowsers; the shirt is also managed in many curious ways. One cannot help asking oneself, if this is their winter dress, what do they wear in summer?

The men are fierce-looking fellows, with long curls and flowing beards. The women happily wear a little more clothing than the men, their faces are concealed by masks, and they seem fond of red as a

colour. In most cases probably they are old and ugly, and thus cling to their masks.* Distance 18 miles.

*March 3rd.*—Left at 6.35 A.M. The road ran through a level plain with a fairish quantity of stones on it, clumps of acacia and oleander also all over it. At 8.40 arrived at the village of Takht, a flourishing place.† Saw another village (Jahun) away in the hills about four miles off to the north-west. Passed around Takht and went along a big grove of date-palms on the right hand; on the left were some high hills with very steep sides; among the crops, which here seemed in a somewhat more forward condition, were numbers of well-grown mimosa trees; about the road I noticed a dwarf sort of oleander, with a star-shaped flower, small, and nearly white, not unlike a white forget-me-not—have not seen anything similar to this elsewhere. At 10.5 A.M. came to the village of Chahistan,‡ 11½ miles, breakfasted, and left at 11.25 A.M. Sun very hot. Still keeping along the road went to the north-east, through country still more park-like in appearance. 12.20 P.M. came to the village of Khushkuh,§ at the foot of the hills of the same name. Ten minutes after leaving this came to a river bed, or rather to the commencement of what turned out to be a large expanse of ground, at times swept by floods; crossing over this, 1.5 P.M. came to the main stream; still carrying on over ground which was but a mass of stones, and every yard of it apparently having only recently been subjected to a severe flood, got out of it at 2 P.M. This was about the roughest piece of riding that I have ever had in this country; it was difficult to keep the horses on their legs. The camels went by a road along the base of the hills, crossing the stream nearly at the point where it emerges from the gorge. This road is the main one from Bandar Abbas to Kirman.

Arrived at Shámil‖ at 2.30 P.M. Distance 22 miles.

*March 4th.*—Halted the day. In the morning I rode up to the point where the river debouches into the plain. It appears to make its way for some distance through a narrow gorge, with hills of some size either side of it. The Kirman road follows this gorge, and must at times be blocked for days together when the river is in full flood. I could not see any road over the hills obviating such a contingency.

After breakfast I went back on the direct road to Takht, and also on that to Ziaret. I had been told that these were bad roads, and quite

* Kálah-i-Kazi, 100 houses, 300 people; 70 oxen, 100 cows; 2500 mâns of wheat and barley sown yearly. Sun-dried bricks, 35 shahis to 2 krans per 1000.

† Takht, 400 houses, 1200 people; 100 oxen, 250 cows, 300 sheep; 2500 mâns of wheat and barley sown yearly; malyát, 1000 tomans.

‡ Chahistan, 40 houses, 100 people; 10 oxen, 50 cows; 250 mâns of wheat and barley sown yearly. Total number of date-trees owned by both villages, 40,000.

§ Khushkuh, 200 houses, 800 people; 68 oxen, 20 cows; 3500 mâns of wheat and barley sown yearly; 15,000 date-trees; malyát, 450 tomans.

‖ Shamil, 170 houses, 500 people; 100 oxen, 100 cows; 5000 mâns of wheat and barley sown yearly; 16,000 date-trees; malyát, 600 tomans.

impassable after heavy rains, and that also near to Ziaret the river was confined to its bed, and did not overflow. The first half mile of this road passed through a dense date-grove, thence for about five miles the ground was covered by what one might call a mimosa jungle, thence on to some salt ground covered with low scrub. At Bandar Abbas, Kalgazi, and Shamil I had been told that the sea road and the *rah-i-meyan* (the middle road), as that which I was on is called, were impracticable after rains, especially for camels. Having gone some 12 miles, and finding that the information given was substantially correct, I returned to Shamil.

At Bandar Abbas and about here the current coin is the rupee. At the former place they would only take the krans at 27 pul instead of 40, and here they would not take them at all.

*March 5th.*—Started at 7 A.M. Road bearing south-east. It passed between the date-grove and some low gravel hills on the left hand. After going for half a mile, crossed a stream issuing from a deep gorge in the hills; on the summit of the one nearest to Shamil were the ruins of the Kálah-i-Shamil, they seemed to cover a lot of ground; I had not been told of these ruins, and so did not examine them. I took an ordinary Tofanchi tower on the hill immediately behind the village to be the much-vaunted Kálah. Up the gorge is the road into the Rudbar district. This stream I was told ultimately joins the one of the day before, and is also a branch of it.

After passing the stream the road still bore to the south-east, but both hills and date-grove diverged. The plain, which as far as I could judge was of rich alluvial soil, was covered with sprouting crops in every direction, amidst them were well-grown mimosa trees and some camel thorn, also some of the small oleander-like shrub.

After going two miles farther passed another small stream. Two and a half miles beyond this came to the village of Chahkhark.* Three and three-quarter miles further on, and a third stream was passed; the bed of this was some 200 yards across. This part of the country is open, and is known as the Sahra Chahkhark. The whole way each side of the road, as far as the eye could reach, seemed to be under cultivation. The road was much cut up by watercourses; the ground everywhere along the march has been very soft, the going being generally easy.

Five miles further on, and again a stream was passed, its bed was about 120 yards across; this stream, they tell me, joins its waters to the Mināb near to the sea. 11.5 A.M., arrived at Gurband,† a thriving village, with a large square Kálah, which is gradually falling into ruin. Distance 15 miles.

* Chahkhark, 80 houses, 350 people; 20 oxen, 50 cows; 1000 māns of wheat and barley sown yearly. As malyát, 10 per cent. of grain is given in lieu of money.

† Gurband, 200 houses, 700 people; 80 oxen, 150 cows, 20 camels; 4000 māns of wheat and barley sown yearly; malyát, 250 krans.

*March 6th.*—Left at 6.25 A.M.; morning again cloudy. The road ran through the same plain, with the lower spurs of the Rudbar hills close on the left hand. The plain under cultivation right up to them, and on the right hand as far as the eye could see. The main range of the Rudbar appears to be about six miles off. Both lines with extremely serrated tops rising here and there to very abrupt peaks; the sides of the distant hills appear to be almost perpendicular.

At 7.20 A.M. passed across the bed of a small stream; 7.47 A.M., passed on the left hand a good-sized village called Dam-i-shahr;* and at 8.5 A.M. a second called Noband.† At 8.30 passed on the left a large date-grove; some of the trees were very fine indeed. At 9 o'clock entered a large date-grove with the village of Shahvar ‡ in the centre of it. The village seems very fairly prosperous; got out of the grove at 10.5, and on the 6th March came on to the bed of Mināb river, with the town of Mināb § on the far side, where we arrived at 10.15 A.M. There is not much water in the river at the present time; depth about two feet, and breadth about 100 yards.

The town consists of numbers of well-built houses, and is surrounded by a mass of date-groves and fine gardens. It is quite the most prosperous place that I have seen on the journey. Distance 16 miles.

The road which I have been following these last two days must be nearly identical with that which Marco Polo took when he visited Hormuz; the plain evidently is that which he calls Formosa. There is no necessity for me to point out that the river Mināb is the ancient Anamis, mentioned by Strabo as the spot where Nearchus beached and repaired his fleet.

I have tried to identify some of the names used by Marco Polo, but have not succeeded. With regard to the wine made from dates mentioned by him, the people tell me that in days gone by they used to make such wine, but that it is never done now.

The chief fruits of the place appear to be dates. The number of date-trees is something enormous, and the people claim that the grove is second in size only to that of Basrah. It runs down each side of the river to the point where tidal effects interfere with the irrigation, about two miles from the sea. The average breadth is about six miles.

* Dam-i-shahr, 70 houses, 250 people; 50 oxen, 50 cows, 30 donkeys; 2500 māns of wheat and barley sown yearly; 2000 date-trees; malyát, 50 tomans.

† Noband, 20 houses, 110 people; 12 oxen, 15 cows, 100 sheep; 300 māns of wheat and barley sown yearly; malyát, 250 krans.

‡ Shahvar, 200 houses, 520 people; 40 oxen, 100 cows; 2000 māns of wheat and barley sown yearly; 4000 date-trees; malyát, 100 tomans.

§ Mināb, 700 houses, 6500 people; 200 camels, 200 oxen, 100 donkeys; 12,000 māns of wheat and barley sown yearly; malyát, 13,000 tomans. Building materials such as gatch and rafters, are generally brought from Bandar Abbas by boat. Rafters of Zanzibar wood cost 3 to 4 krans each, and gatch about 7 to 10 krans the 100 māns. Gatch is also to be found in the hills. Sun-dried bricks cost 2 krans per 1000. Labourers' pay about 15 shahis per diem; masons, 2½ krans per diem.

Secondly come mangoes, then oranges of sorts, citrons, shaddocks, and lemons; no stone fruit or nuts are to be found.

During the winter and spring there is always plenty of water to be found in the river, but in summer it is all used up for irrigation, and only near the mouth is there any flow.

The people of the place are most civil and obliging; they seem happy, well conducted, and prosperous. They are all more or less employed in agriculture, and do not appear to have any industry peculiar to the place. There is a small colony of Shikarpūr merchants, who seem to thrive, and appear, as far as I could learn, to be well treated.

*March 7th.*—Went up to the Kálah this morning, and had a good look round. It is built of kiln-burnt brick, and partly of sun-dried; in former days it must have been a fairly strong place. The hillside is covered with bastions, towers, and connecting walls; at the foot of the hills is a large square enclosure, with high walls and flanking towers, inside these is a space of at least five acres in extent containing many good and substantial houses. The walls are about 20 feet high, and built of sun-dried bricks. From the top I notice a sort of valley between some low hills at the back of the date-grove from Shahvar and the main range.

After breakfast I rode across to a point opposite the Kálah, the water in the river had much increased in volume and was very muddy, at two points where I tried to cross I was nearly carried away. I at last managed to get across with some little difficulty and a good wetting. Opposite the Kálah on this side of the river are some small sandstone hills, date groves and gardens, then a small bridle path leads through a narrow valley and comes out nearly opposite to Shahvar. The hills are about 100 feet high, very curiously formed with jagged edges.

*March 8th.*—Round about Mināb and also in the fields along the road wherever there are ripening crops, boys are usefully employed in keeping the clouds of sparrows and other small birds from destroying them. This they accomplish by means of shouting and throwing stones with slings; their slings are precisely similar to those we are familiar with at home. They are very good shots and the birds seem to have but a bad time of it. The noise the slingers make with their slings is as continuous as a company of soldiers (Persians) file firing.

*March 9th.*—Left at 6.25 A.M. For some little distance the road passed between some low sandstone hills on the left, and the date-grove on the right; it then cut into the plain, bearing nearly due south; about here there was not much cultivation, the plain was however covered with camel thorn and low scrub. At 7.53 passed through the bed of a small stream without any water in it, in spite of the heavy rain of yesterday. Country very flat. At 10 A.M., halted close to a river and near to a small village called Chah Kambar.* 12 P.M., off again. At

* Chah Kambar, 15 houses, 60 people; 10 oxen, 50 cows, 10 camels, 150 sheep; 500 māns of wheat and barley sown yearly; no malyāt.

12.18 crossed the river at a place called Ju Mahallah. This is but a small village of three or four houses. On the hill-top nearest to the ford is a small round tower in ruins. The stream is broad but not deep. I am told that this stream rises in the Bashakird hill, and winds out of the plain to the sea. It appeared to me to join the Mināb near to the sea. It certainly has no connection with it this side of the sandhills. All about here and right up to Kalavy * the ground is very soft; there is a good deal of salt incrustation about and near to Kalavy; it is a regular marsh, very trying to the horses. Distance 22 miles.

There have been many conjectures regarding the plain between the two deserts in Marco Polo's journey to Hormuz which he has called "Reobarles." It seems to me to be set at rest by reason that the correct name of the hills behind Mināb is "Rudbal," not Rudkan as set down in our maps. The chances are that if the plain or district behind these hills is now really called "Rudbar" that the original name has been retained in that of the hills by the Minābees.

In Persia, hills as a rule derive their names either from the district in which they are or else from a certain town or village near to them. It is rare to find them with distinctive names. I should not be surprised if proper investigation proved that "Rudbal" was also the name of the district. Names cannot be trusted which are given you in talk by the people about.

In this case I had heard the hills spoken of and had spoken of them a dozen times at least as "Rudbár" and "Rudkán"; I had also heard them called "Ruddán"; it was only when I was writing it down from the Persians that I saw it was "Rudbal"; even then the coincidence did not strike me. Only next day when on the marsh cogitating over various things, did it dawn on me that here was the solution to the mystery of Marco Polo's "Plain of Reobarles."

Although it is two long days' march from the gorge of the Zindan river to Bandar Abbas, yet from that point to Hormuz can only be some 40 to 42 miles. The road would run through cultivation the whole way.

With reference to the hot winds mentioned by him. I made close inquiries at Bandar Abbas and elsewhere regarding them. It was very generally stated that there had been some change in the climate of these parts, and that now they are not visited by such winds as would kill people. Still those who can leave Bandar Abbas during the great heats do so, and take refuge either in the shady gardens at the top of Ganao or go to Mināb. The hot springs still exist at the foot of Ganao and still have the supposed effects ascribed to them by Marco Polo.

*March 10th.*—In the plain passed the two villages of Ramchan and Dodar. The plain extends for many miles to the south, between the

* Kalavy, 44 houses, 120 people; 20 oxen, 10 cows, 150 sheep, 30 camels; 1000 date-trees; 1100 māns of wheat and barley sown yearly.

outlying spurs of the Bashakird and the hills bordering the sea. All the hills in the foreground were sandstone, whilst those of the main range appeared to be limestone. The plain is much cut up by water-courses and in some places fair streams.

*March 11th.*—Rained heavily all night. During the night one of the huts came down, and a beam smashed my prismatic compass. From this point I had only a small pocket compass to take bearings with.

Left at 8 A.M. Road across a very bad bit of ground, it was generally soft and in places deep; we often had to diverge a great deal before being able to pass a bad bit of ground. In one place I got well in, my horse sinking to the shoulders, then all the servants, one after the other, did the same. This was about the only real bit of fun that we have had during the whole journey.

At last got out of the bad ground on to some good hard going at the back of a date-grove and along the base of some small hills, it having taken us an hour and a half to do three short miles.

At 10 A.M. got to Kuhistak;* waited until the mules came up, they only arrived at 12.30 P.M., every mule showing by the mud on the baggage that it had been down. We then started again, crossing at its mouth a small stream—Chahlak it is called. After leaving this the road went along the sands quite close to the sea. Course due south. The Arab coast to be seen to the west and south-west. 1.40 P.M., crossed another stream. At 3 P.M. passed a village in the sandhills to the left, about a mile off, called Ziaret. The road still on the sands with the sea about 100 yards off. At 4.35 P.M. reached the village of Geru.† During the march had a great deal of heavy rain. Geru is something like a mile inland among a group of sandhills. Just on entering the village crossed a small stream. Distance 20 miles.

*March 12th.*—During the night it rained very heavily, there were also tremendous storms of thunder and lightning. Leaving was quite out of the question.

*March 13th.*—Rain, thunder, and lightning again the whole night, and raining heavily now, but as I could not afford to waste any more time, made a start at 8.30; for about two miles followed the line of some sandhills, then it came on to rain harder than ever. From this point road went out into an open plain with lots of camel thorn and low scrub all about. At 9.20 passed the village of Tahruy; at 10.30 passed another village called Sérik.

On the left were a lot of hills of fairish height about three miles off.

* Kuhistak, 110 houses, 300 people; 20 oxen, 160 cows, 20 camels, 250 sheep; 10 donkeys; 1700 date-trees; 1000 mâns of wheat and barley sown yearly; malyát of Kalavy and Kuhistak, 100 tomans.

† Kohsiah, 25 houses, 120 people; 10 oxen, 20 cows; 500 mâns of wheat and barley sown yearly; 1000 date-trees; malyát, 35 tomans.

Geru, 150 houses, 440 people; 24 oxen, 100 cows, 170 sheep, 20 camels; 3000 mâns of wheat and barley sown yearly; 2000 date-trees; malyát, 100 tomans.

On the right a succession of date-groves, and the sea in the far distance. The ground all about was soft going. A number of small streams were full of muddy water. These streams are evidently the draining of the hills to the left, which must be clayey as the water is very white. None of them of any importance. 11.50 came to the village of Kardir* and stopped alongside to breakfast. 1.5, started again, and in an hour came to the Gez river; a deep swift flowing stream about 60 yards across, and running about six miles an hour. Tried it and found it would be impossible for laden mules to cross, so perforce had to camp.

I am told by some people who were about that they have been stopped here for six days, waiting for it to fall sufficiently to enable them to cross; rain, however, has fallen daily and prevented them. The water is evidently decreasing, and we may be able to cross to-morrow supposing no heavy rains fall during the night. Distance 14 miles.

*March 14th.*—The river fell at least three feet during the night, but it is still too deep for mules to cross without getting their loads wetted.

The plain is similar to that which we have hitherto followed, but in addition to the mimosa there are numerous gez trees, some very fine. At 1.30 P.M. started and succeeded in getting the whole camp across the river by 3.30. All damageable articles had to be put on camels. The water must have been at deepest part about three feet deep. Went on to Gez † and camped there for the night. Distance two miles.

*March 15th.*—Left at 6.18 A.M. At 7.25 passed the village of Gawan on the left and Namordi ‡ on the right, about two miles off. 8.25 A.M., crossed a river, not much water in it, but the banks high and steep, about 160 yards across. 8.53, passed the village of Zerabad on the left. 9.45, passed through the village of Sekui, and at 10.45 arrived at Karat.§ Distance 16 miles. The Beloochis here are very close and refuse to give any particulars about their villages.

*March 16th.*—Travelled to the south-east for about a mile until we got under the hills. At 6.12 passed a narrow but deep bed of a stream with but little water in it. A day or two ago it was full and impassable; this was a really nasty spot. I am sure any one trying to cross it when in flood would certainly be lost. 7.35, passed by the village of Brizg, on the right hand about a mile off. On the far right were some date-

* Kardir, 20 houses, 100 people; 14 oxen, 200 sheep; 500 mâns of wheat and barley sown yearly; 1000 date-trees.

† Gez, 20 houses, 100 people; 14 oxen, 8 camels, 70 cows, 12 donkeys, 150 sheep; 500 mâns of wheat and barley sown yearly; 500 date-trees; malyát, 30 tomans.

‡ Namordi, 150 houses, 450 people; 24 oxen, 70 cows, 15 camels, 16 donkeys, 200 sheep; 1200 mâns of wheat and barley sown yearly; 1000 date-trees; malyát, 40 tomans.

§ Karat, 20 houses, 110 people; 16 oxen, 40 cows, 100 sheep; 400 mâns of wheat and barley sown yearly; 300 date-trees.

groves, and beyond them occasional glimpses of the sea could be got. Sandstone hills on the left hand about half a mile off. Sharp pointed peaks, and with that broken-off aspect common to up country. 8.5, low hills now to the right as well as on the left. At 8.25 got in among them, they are of sandstone, cut into curious and at times fantastic shapes, some resembling statues of colossal size. The whole place appears as if it had been subject to the effects of either the sea or else of running water within recent times. At 9.5 passed the village of Gawan, and 9.35 came to the village of Mukhjangan, where we breakfasted.

There we were interviewed by a Belooch chief, a fine-looking fellow got up in very gorgeous attire, covered with arms of all sorts, including the ever-present hide shield. He commenced to talk very big, but after a time quieted down and ended by begging for krans and powder.

11.20 A.M., off again. Plain sandy, crossed another stream with very deep sides, about 18 yards across. This would also be a bad spot in heavy rains. Followed the plain until we arrived at Gatan * at 1.5 P.M. Distance 20½ miles. Low sandstone rocks in every direction. Kuh Mubarrek in the distance, nearly due south.

*March 17th.*—Left at 5.48 A.M., fine clear morning. Went away across the plain to the S.S.E. to get out of a line of bad ground. We have been threatened all along the march since leaving Bandar Abbas with what the natives call *meens*. A meen appears to be a piece of treacherous ground, it has a fair face but no secure bottom. I made the acquaintance of one to-day and did not find it pleasant. The guides walking along quietly in front passed over the ground easily, it looked all good hard land. All at once my horse plunged and sank to the girths. Thinking that it was only a small bit of bad ground, I sent him along for some yards; finding he could get no further I got off. The poor beast had sunk up to the shoulders in the ground, and looked wofully distressed; we only managed to get him out with difficulty, and after good hard work. I almost thought that I should lose him. After heavy rains the whole of this part of the country gets covered with these meens. I suppose that they are due in some way to imperfect drainage, the country being so flat, or perhaps some peculiarity in the strata not allowing the water to drain off. The sun dries the top, leaving these treacherous spots below.

The plain near the hills on the left was dotted with scrub and proved better for travelling. At 9.5 came to the village of Kuh Mubarek in among some small hills, and at 9.45 halted to breakfast, Kuh Mubarek bearing W.N.W. 11.15, off again. The plain hereabout was entirely sand, and we were caught in about as bad a

* Gatan, 100 houses, 450 people; 30 oxen, 120 cows, 250 sheep, 5 donkeys; 400 mans of wheat and barley, also Indian corn, sown yearly; 2000 date-trees, malyát, 30 tomans.

storm of wind as I have rarely experienced; in spite of the late rains having beaten the sand down, yet it blows about in such clouds that at times one could not see a yard beyond the horse's ears; there was not a tree or a shrub to break the force, the sand and small stones were blown into our face with such force as to be absolutely painful. Happily the direction of the storm was so as to strike one on the beam; to have faced it would have been impossible.

At 11.55 passed a small river bed with deep steep sides, at 12.45 came to another of the same description, and at 1.15 P.M. arrived at the village of Gangán where we camped; it was but a bad spot, but going on in such weather was not to be thought of. Distance 20 miles.

*March 18th.*—Left at 5.35 A.M. The road over the same sandy plain with but little scrub about, bore for a hill E.N.E., which we fetched in about an hour; went round it and carried on in the same direction; passing some date-groves, and through a more wooded country, chiefly gez-trees. At 7.12 passed a river called Taberkan about 100 yards across. We came this way as we were told that this river on the direct road would be very difficult to cross. It would stop one even here I imagine, after a continuance of wet weather. Bearing now E.S.E. At 8.25 came to a small river bed with steep sides, another nasty spot in the rains. Ground all along sandy with slight dark incrustation. Passed several fine date-groves, and at 9.45 camped under one for breakfast.

At 11.15 off again; country as before for nearly eight miles when we came to the village of Jashk. Distance 23 miles. From the sandhills close by the telegraph buildings are visible about 10 miles away.

*March 19th.*—Marched into Jashk telegraph office, the first mile across the plain, then through and over some sandhills on to a masheelah for about three miles, then across the peninsula to the office. Distance eight miles.

Here terminated a journey which I had longed to undertake for many years, thinking that in a country so little known as this part of Persia, I should be sure to see something worthy of note and not previously described. But my hopes were not realised; the whole road was traversed without anything new or of interest to the antiquarian being discovered.

Between Shiraz and Bandar Abbas, by reference to the route map which accompanies this report, it will be noticed that the road follows a series of small plains between two ranges of hills; these ranges differ in no way from others more to the north or south of the main road in Persia; they have a uniform direction from north-west to south-east, and present the usual characterless appearance to the traveller's eye, which makes the Persian landscape so spiritless and uninteresting. As a rule the ranges are of nearly a uniform height, with a bold bluff on the one side and a shelving slope on the reverse. There are some, how-

ever, which in places develope into peaks, and have a certain individuality, such as Kuh Darakty, Jain Kalatu, and Farkun. The average height of the prominent hills in the northern range I judge to vary between 8000 to 10,000 feet, whilst to the south I imagine that after leaving Maharlu there was nothing exceeding 7000 feet in height. Farkun is however a very fine bold hill with two very prominent peaks, the southern one being the highest. By the amount of snow on it, and the lowness of the line, I think that it must be 12,000 to 13,000 feet high at the very least. It is curious that this was the only hill that was invariably called by the same name at all points of the road from Tarkat to Mināb.

These hills all are, as far as I could judge, of limestone, with slopes of gravel at their feet. Above Bandar Abbas, from the Garm Hills until the sandstone rocks are reached, in one large gravel slope. The hills behind Shamil and Mināb, the Rudbal, are also limestone, with gravel slopes and hillocks in front; beyond this the hills are all of sandstone interspersed with a pale grey clay.

The rivers passed throughout the journey were utterly insignificant. The salt one in the plain of Tashkird, near its western extremity, was only a few inches deep. The two salt rivers in the Sahrá-i-Kunuk behind Bandar Abbas apparently are only perennial, as also are those of Zindan and Shamil. In the Mināb stream there is water all the year round, but it is absorbed in cultivation.

The Chahlak and Gez, although they are supposed to drain the western slopes of the Bashakird country, are in ordinary times of little or no importance.

Now and again some talk of a railway through Persia crops up. Should at any time the question of a railway to the Persian Gulf take tangible form, a careful survey of this route, I am convinced, will repay the projectors. As against the Shiraz-Bushire route there can be no doubt of its greater adaptability. It is true it is nearly double the distance, but against this it has several advantages; in the first place, the engineering difficulties are nearly nil, whereas those on the Shiraz-Bushire are innumerable, Secondly, it would decrease the sea journey by some 450 miles; thirdly, at or near to Bandar Abbas a convenient and sheltered roadstead could be found, in place of the extremely inconvenient and open one at Bushire; fourthly, a railway along this route would tap a large grain-growing country and would be easy of access to the merchants of Yezd and Kirman.

It was lately stated in a book on Persia that there is little change but much decay in Persia. At the time I read this I thought the author was a little severe on the country. Since I have made this journey, I am more than ever of opinion that, as far as the south is concerned, he is wrong; there is not only change, but what decay there is is in the right direction. Some few weeks before I started on my

trip, one of the chief men of the province, the Mushir-ul-Mulk, died. Within a fortnight of this event his great rival, the Kawam-ul-Mulk, also died. These two men with their intrigues had for years kept the province in a state of ferment. Whenever the one was in power, the other did what he could to oust him, a favourite dodge to this end being the investigation of robberies. Some ten years ago a party of six of us travelled up to Teheran and had to take an escort of some twenty men for our caravan, owing to the numbers of robbers who infested the roads; then the Mushir was in power. In 1877 some friends of mine were travelling in the Darab country, and they could only get on by means of strong escorts. The rival partisans were out, and robberies and murders were of daily occurrence. After the death of these two men, I naturally anticipated that although the province had been exceptionally peaceful for years, yet now the tribes would be sure to be looting and fighting. But it was quite the contrary; nothing could have been more peaceful and quiet than the demeanour of all I came across.

These two men were the two chiefs of the lootee sects of Shiraz, but their several deaths caused no excitement or rows in the place, whereas some few years ago these two sects of looters met nearly daily for free fights which generally ended in some disastrous way.

Below Bandar Abbas, the castles of Shamil and Mināb and the strong protecting towers and walls of the various villages which I passed through, were all visibly falling into decay. This all tends to prove change, and change of the right sort. It shows incontrovertibly, I think, that the Persian tribesman and Belooch marauder are becoming amenable to the law, and that now there is some regard paid to life and property.

About Teheran the Shah is continually causing improvements to be made, and is gradually making his capital town something better than the collection of mud huts that it was some twenty years ago. In Ispahan, his son has to a small extent followed his example. In Shiraz the Governor has repaired various ancient buildings and rescued them from destruction. In Bandar Abbas the Acting Governor has repaired the factory of the old Dutch Company and made it into one of the finest houses in Persia, but he is also now building a small stone pier opposite to it, to facilitate the landing of cargo from the ships.

All this shows change and not decay, and I can only hope that it may go on increasing year by year. Persia has great capabilities and resources, and if these are only directed into the right channels, there is every chance of her future being a prosperous one.

*List of Stations and Distances from Shiraz to Jashk.*

| From | To | Distances in English miles. | |
|---|---|---|---|
| Shiraz .. .. .. .. .. | Maharlu .. .. .. .. | 23¾ | |
| Maharlu .. .. .. .. | Sarvistán .. .. .. .. | 25½ | |
| Sarvistán .. .. .. .. | Meyan Jangal .. .. .. | 16¼ | |
| Meyan Jangal .. .. .. | Nabandagan .. .. .. | 13 | |
| Nabandagan .. .. .. | Sheshdeh .. .. .. .. | 12 | |
| Sheshdeh .. .. .. .. | Darakhuyeh .. .. .. | 13 | |
| Darakhuyeh .. .. .. | Darabjird .. .. .. .. | 24 | |
| | | | (127½) |
| Darabjird .. .. .. .. | Deh Khayr .. .. .. | 10 | |
| Deh Khayr .. .. .. | Rosak .. .. .. .. | 28 | |
| Rosak .. .. .. .. .. | Forg .. .. .. .. .. | 14 | |
| Forg .. .. .. .. .. | Taskat .. .. .. .. | 19¼ | |
| Taskat .. .. .. .. | Seyud Jowdar .. .. .. | 26 | |
| Seyud Jowdar .. .. .. | Sa'ádatábád .. .. .. | 13½ | |
| Sa'ádatábád .. .. .. | Gohrah .. .. .. .. | 29 | |
| Gohrah .. .. .. .. | Zuratu .. .. .. .. | 7 | |
| Zuratu .. .. .. .. | Sarzeh .. .. .. .. | 17 | |
| Sarzeh .. .. .. .. | Berker .. .. .. .. | 16½ | |
| Berkeh .. .. .. .. | Bandar Abbas .. .. .. | 16 | |
| | | | 341¼ |
| Bandar Abbas .. .. .. | Berkeh .. .. .. .. | 16 | |
| Berkeh .. .. .. .. | Kalgazi .. .. .. .. | 18 | |
| Kalgazi .. .. .. .. | Shamil .. .. .. .. | 22 | |
| Shamil .. .. .. .. | Gurband .. .. .. .. | 15 | |
| Gurband .. .. .. .. | Mináb .. .. .. .. .. | 16 | |
| Mináb .. .. .. .. .. | Kalavy .. .. .. .. | 22 | |
| Kalavy .. .. .. .. | Geru .. .. .. .. .. | 20 | |
| Geru .. .. .. .. .. | Gez .. .. .. .. .. | 17 | |
| Gez .. .. .. .. .. | Karát .. .. .. .. .. | 16 | |
| Karát .. .. .. .. .. | Galán .. .. .. .. .. | 20½ | |
| Galán .. .. .. .. .. | Gángán .. .. .. .. | 20 | |
| Gángán .. .. .. .. | Jashk village .. .. .. | 23 | |
| Jashk village .. .. .. | Jashk telegraph office .. | 8 | |
| | | | 233½ |
| | Total .. .. | | 574¾ |

SHIRAZ, *August 16th*, 1884.

Previous to the reading of the paper,

The CHAIRMAN (Sir J. H. Lefroy) wished to express his great regret that Sir Henry Rawlinson was prevented by indisposition from occupying the chair. No one else could throw such a flood of light upon any question relating to the Empire of Persia, and it was much to his own regret that he was debarred from being present. The paper to be read was an account of an expedition made under the auspices of the Indo-European Telegraph Department from Shiraz to Jashk, a great part of the route having never before been described by any European traveller. It was a route which was of considerable interest at the present time, because from the peculiar embarrassments and difficulties attending the management of submarine cables, it was not impossible that sooner or later it would be necessary to have a land line through Persia. About sixty or seventy miles of the ground which Mr. Preece went over was described in considerable

detail some years ago by Sir William Ouseley, but from Shiraz to Bandar Abbas was new ground, and it was very gratifying to find that the inhabitants received a European in a friendly spirit, and treated him with kindness and hospitality.

After the paper,

Colonel CHAMPAIN said that telegraph lines ran, by means of a double cable in the Persian Gulf, from Karachi to Bushire, and so on by land to Teheran, and to England. One cable joined on to Turkish territory. These cables were not so young as they were, and gave more trouble between Bushire and Jashk than they did formerly. It therefore became necessary to look forward to either repairing them, laying new ones, or running an alternative land line. If a land line were laid from Shiraz to Jashk, there would be an aerial wire all the way from Calcutta to opposite Lowestoft. Being at Bushire last year, he was fortunate enough to meet Mr. Preece, a brother of the distinguished electrician at the General Post Office, and asked him to go over the ground and see if there were any physical obstacles to be encountered. A better man for the work could not have been found. He had been in Persia sixteen years, spoke the language exceedingly well, and was an admirable traveller. A great part of the country was absolutely unknown to Europeans, being marked "unexplored" on the maps, and he could find no one who had heard of any traveller who had gone from Bandar Abbas to Darabjird, or from Minab to Jashk. Mr. Preece made the journey very successfully, but although there were no physical obstacles, Colonel Champain was hardly inclined to think that the land line would be made yet a while. From economical reasons it would probably be advisable to stick to the sea at present.

Sir FREDERIC GOLDSMID said he could not speak from personal experience of the road between Shiraz and Jashk, but he knew the terminal points tolerably well. He was at Shiraz during the famine of 1871, and was one of the few visitors to Jashk before it had become the residence of Englishmen. He had also been to Bandar Abbas, having on one occasion entered Persia from that port, and gone up to the north. From Shiraz to Darabjird the road had been previously traversed by Europeans. Mr. Consul-General Abbott went over it in 1850, and passed back by a different route to Kázarún. His journey was described in very minute detail in the records of the Royal Geographical Society, and the record was very useful for geographical purposes. This traveller had also given a clear account of the ruins mentioned in the paper just read, but he called them "Naksh-i-Rústam," the name applied to the better known rock inscriptions near Persepolis. He was not aware that the journey through Forg to Bandar Abbas had ever before been done by any European,* but the district to the immediate south had been frequently visited. It is spoken of by the old Arabian geographer, Ibn Batuta,† in the 14th century, who crossed over from Ormuz to the mainland, and passing up to Lár, came down from that place to the sea. There was a very good French translation of his work in four

* Since making this remark, I have found in my note-book that Mr. Dupré left Shiraz on the 17th of January, 1808, and passing through Darab and Forg, reached Bandar Abbas on the 5th of February. He returned from the latter port on the 14th of the same month, and arrived at Shiraz, by Lár, on or about the 2nd of March. The journey is narrated in his 'Voyage en Perse,' published by Dentu, 1819.—F. J. G.

† Ibn Batuta, 14th century (middle), crossed from the island of Hormuz to the mainland to visit a holy man at Khondjopál. He marched under escort of Turkmans over a desert of four days' journey, filled with limbs of men killed by the Simúm, through Kavristan; then across a second desert to Lár. Thence he appears to have gone down to the coast near Káis.—F. J. G.

volumes. Lár was also visited by M. de Rochechouart, the French Chargé d'affaires at Tehran, when that gentleman proceeded from the Shah's capital to Karmán, some months after he himself (Sir F. Goldsmid) and Major Murdoch Smith, R.E., had passed through the latter province. A narrative of his journey was published at Paris in 1867. By this it appears that he had returned by Bandar Abbas, Lár, and Shiraz, his route being a little to the south of that followed by Mr. Preece. He reckoned the whole distance from Bandar Abbas to Shiraz 360 miles, being 18¾ miles more than that now computed for the upper route. M. de Rochechouart mentioned that there were two roads, and probably he referred to that traversed by Mr. Preece, as the alternative to his own.* If so, he said it was a very difficult one, and that was the general opinion of the country people in the time of Ibn Batuta. He (the speaker) was glad to find that Mr. Preece bore such favourable testimony to the hospitality of the Persian governors and people, for he himself had experienced it more than once. When he first reached Karmán as a simple traveller he was received with extraordinary kindness; more so indeed, if distinction could be drawn, than when, years afterwards, he had appeared at the same city in charge of an important mission. Mr. Preece had said that the mountains near Mináb were called "Rudbal" and not "Rudbár." He believed this apparent difference to be of little import. The *l* and the *r* continually change places, and Rudbál and Rudbár may be practically regarded as the same word. There was a well-known town on the Indus called Rohri, which in old books was written Lohri. Many similar instances might be added. He had one remark to submit in conclusion. Mr. Preece's journey showed that it would be easy to make a railway between Shiraz and Jashk. That was noteworthy, because from Jashk to Karáchi the rails could be laid along the coast, nearly in accordance with the telegraph line. The question was how to get to Shiraz, but he felt sure that there would ultimately be a railway from Constantinople to Baghdad, and when this was completed no doubt a way would be found from Baghdad to Shiraz. The advantage of such a line was that it would pass through what was now shown to be a considerable tract of fertile country, and render the route to India entirely independent of any railways which might be made in the north of Persia or Afghanistan.

The CHAIRMAN said that Sir William Ouseley had stated that the watercourse at Fassa abounded with otters. That might perhaps be an inducement to some gentlemen to make their way there. The sculpture at Fassa, mentioned in the paper, commemorated the defeat of the Romans under Valerian by Sharpur. It appeared to have undergone little change for the worse since it was seen seventy or eighty years ago by the traveller he had just named, who gave a drawing of it. Mr. Preece had not referred to the very interesting speculation as to whether or not the tomb of Cyrus was still to be found at Fassa. Colonel Champain had seen a monument which from time immemorial had been supposed to be that tomb. Sir William Ouseley rather

---

* Rochechouart ('Souvenirs d'un Voyage en Perse,' 1867):—There are two roads between Bandar Abbas and Shiraz, one by the mountains and Darab, almost impracticable; one by Lár, better, but greatly desert. Distance 103 farsakhs or 360 miles. For five days, up to Lár, not a village, nor a man seen; wooded, but vegetation stunted and trees shrivelled. Many caravanserais and tanks of Shah Abbas; nomad tribes of Lár plunderers; they repair tanks and regulate traffic, but care not for caravanserais. Lár is an important place, surrounding country very fertile in cereals, cotton, and tobacco. Of latter 4,000,000 kilogrammes exported for spices and cotton stuffs. Between Lár and Shiraz fine fertile plains as in Europe.

Járum (*Abbott's Jehrum*) a town of 10,000 souls; less advantageously situated than Lár; traffic of similar kind, but distance from sea great.

came to the conclusion that it was not. With regard to Darab, Sir William's Persian guide told him that the inhabitants were "an admirable people," making the very strongest arrack out of dates, and being always drunk. That showed that the precepts of Hafiz had not been entirely forgotten, and, in fact, Sir William Ouseley himself, after some becoming shyness and modesty on the part of his entertainer, succeeded in getting some of the liquid. The trait of conviviality had therefore not wholly disappeared under Moslem rule in Persia. The question of the expediency, on commercial grounds, of forming an independent line of railway through the southern portion of Persia to render England independent of the line which was being rapidly and energetically developed along the northern frontier, was one of great interest, but it was environed with many delicate considerations. All must hope that Sir F. Goldsmid's prediction would be carried out—that before long there would be a railway to Baghdad. There was still a concession for a railway from Baghdad to Shiraz, and from Shiraz to Teheran. Whatever might be the motives leading to its construction, the railway must increase the commercial intercourse between Persia and British India. In conclusion, he proposed a vote of thanks to Mr. Preece and Colonel Champain.

---

### *Note on Mr. Preece's Journey from Shiraz to Jashk.*

By Major-General Sir Frederic J. Goldsmid, C.B., K.C.S.I.

This route may be considered under four separate heads, viz.:—

| | miles. |
|---|---|
| I. Shiraz to Dárâb (Dárábjird) .. .. .. .. .. | 145 |
| II. Dárâb to Bandar Abbas .. .. .. .. .. .. | 196¼ |
| III. Bandar Abbas to Minâb .. .. .. .. .. .. | 87 |
| IV. Minâb to Jashk .. .. .. .. .. .. .. .. | 146½ |
| Total .. .. | 574¾ |

I. Besides Ouseley three travellers have, within the limits of the present century, but at long intervals apart, described the journey from Shiraz to Dárâb: M. Du Pré in January 1808; Consul-General Abbott, in March 1850; and now Mr. Preece, at the commencement of the past year. Reckoning the farsakh at 3¼ miles, we find the distance given by the first to be only two miles less than the 145 above shown, but Abbott reckons it at no more than 136 miles. M. Du Pré was seven days *en route*, and did not halt; Abbott took six days, inclusive of one halt at Fassa; Preece halted a day at Fassa, and made a first march of five miles only, thus prolonging his time to nine days. The old French traveller, however, owing partly to heavy rains, made three marches where Preece made two into Dárâb, and where Abbott made one long march of 35 miles. Four of the stages are common to the three records, but the names are not always spelt alike. Thus we find Mally, Mahullu, and Mahárlu; Selvissoun and Sarvistán; Chisté, Shish Deh, and Sheshdeh; Dárábjerd and Dárábjird. Du Pré describes Dárâb much as represented at the present day. Its houses are built of earth (mud), with fine gardens, containing vines and fruit-trees, such as palm and orange, and it has a bazaar with a dozen ill-provided shops. He makes mention, exceptionally, of six mosques, two caravanserais, potteries, and oil-mills; and estimates the population (including 100 Jews) at 4000—a third less than in 1884. Singularly enough, he is silent on the ruins, of which so much valuable detail is furnished by Messrs. Abbott and Preece.

II. From Dárâb to Bandar Abbas M. Du Pré makes his distance within a farsakh that of Mr. Preece, and the slight discrepancy apparent is explained by a divergence in the two routes adopted. This is notably illustrated in a visit to Tárún, which the more modern traveller seems to have avoided, though he mentions the place incidentally. The accordance in the general line of direction may be seen by a comparison of the following summary with the latest maps of Persia :—

| Du Pré. | farsakhs. | Preece. | miles. |
|---|---|---|---|
| Dárâb to Deh Khair .. .. | 2½ | Dárâb to Deh Khair .. .. | 10 |
| Deh Khair to Rostak .. .. | 8 | Deh Khair to Rosak .. .. | 28 |
| Rostak to Forg .. .. .. .. | 4 | Rosak to Forg .. .. .. .. | 14 |
| Forg to Tashkúh .. .. .. | 6 | Forg to Taskat .. .. .. .. | 19¼ |
| Tashkúh to Tárún .. .. .. | 6 | Taskat to Seyud Jaudár .. .. | 26 |
| Tárún to Palingún .. .. .. | 3 | Seyud Jaudár to Saadatabád .. | 13½ |
| Palingún to Gora .. .. .. | 10 | Saadatabád to Gohra .. .. | 29 |
| Gora to Finn .. .. .. .. | 5 | Gohra to Zuratu .. .. .. | 7 |
| Finn to Riswant } .. .. .. | 6 | Zuratu to Sarzeh .. .. .. | 17 |
| Riswant to Issin } | | Sarzeh to Berker .. .. .. | 16½ |
| Issin to Bandar Abbas .. .. | 5 | Berker to Bandar Abbas .. | 16 |
| | 55½ | | 196¼ |
| or | 194 miles. | | |

Despite of discordance of spelling, there can be no doubt that five of the eleven stages here noted—viz. Deh Khair, Rostak, Forg, Tashkúh, and Gora—are common to both records, while Preece himself identifies Riswant (Rezwan) with one of the three villages of Sarzeh, and makes special mention of the road from Gora to Finn, as being N.N.W. of Sarzeh. There is no difference in the number of marches; but Du Pré halted one day at Forg, and one at Tarún; Preece, two days at Forg and one day at Sarzeh. The earlier explorer did not find Deh Khair so prosperous a place as in days of yore, or as it appears to have now become; and stated his impression that the name itself signified "no village at all," because *deh* is a village, and *khair* commonly used as a negative; but opinions may differ in this interpretation of Persian idiom. He alludes to the watercourse noticed by the writer of the foregoing paper on the march from Dárâb, and both he and Mr. Preece took the shorter of the two roads between Rostak (Rosak) and Forg. Entering the latter place by a ruined bridge, he remarked that the town was partly walled in, but that the outside ditches had been badly dug. In reckoning the inhabitants at not quite 2000, he made use of a figure four times in excess of that recorded by Preece. Both writers mention the "remains of a ruined castle . . . known as the Kalah Bahman," a spot indicated on D'Anville's map as "*le chateau du roi Bahmen.*"

III. From Bandar Abbas we take leave of M. Du Pré who, after visiting Ormuz, Kishm, and the neighbouring islands, returned to Shiraz by Lár and Járum. But we need not go far back to find a traveller to Minâb. In the autumn of 1876, Mr. Ernest Floyer, of the Telegraph Department, went across the "same fifty-four miles" of "fiery desert" which separate it, as he tells us, from the "Bandar," and practically reached it within four-and-twenty hours. "My host and I," he writes, "got camels at ten o'clock one night, and at seven next evening arrived among the date-trees three or four miles below the fort."* The break-down of his donkeys, which had been substituted for the larger animals, caused him to undertake "one of

* 'Unexplored Baluchistan,' p. 140.

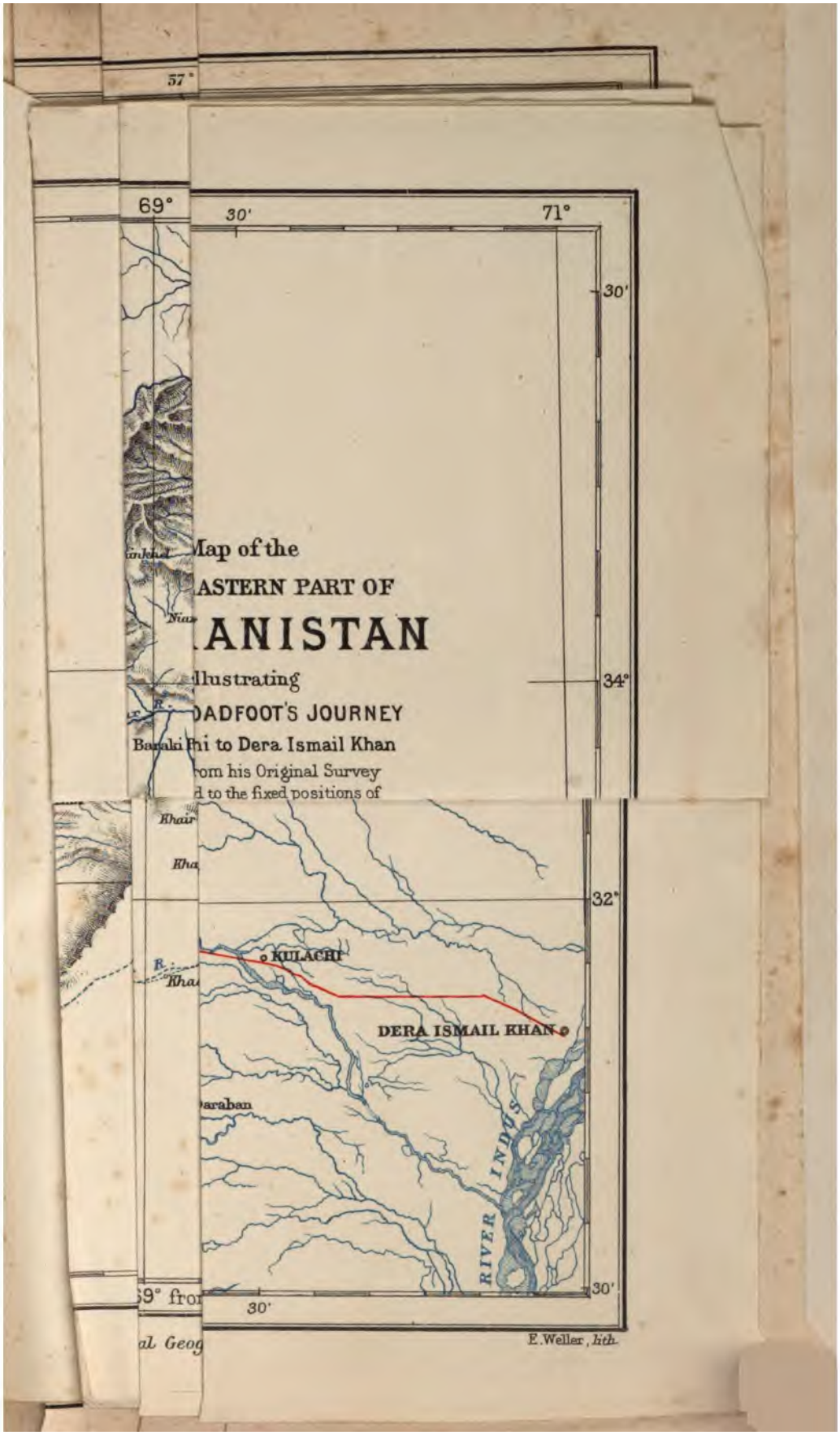
the longest foot marches" he had ever made in order to get back to his original starting-point. But Captain Grant had performed the same journey in 1809, and mentions three roads between Minâb and Bandar Abbas: the centre, by which he himself travelled, another by the sea-shore, and the third, the most frequented, at the foot of the hills. The last is clearly that of Mr. Preece—about 30 miles longer than Captain Grant's, which, from the distance specified, 56 miles, was doubtless the same as Floyer's, or the direct route across the desert.

IV. For the journey from Minâb to Jashk I must again revert to Captain Grant's journal. This valuable paper was reprinted at my recommendation, by order of the Bombay Government, about twenty years ago, and from it I gather the following particulars. The writer was at Jashk on the 20th April, 1809. He describes it as "a few palm plantations on the road . . . about two miles from the sea, and eight from the hills. The town consists of about 250 huts, with a mud fort . . . now almost deserted, ow ng to a pestilential fever having raged here for some months." On the 21st April, Captain Grant marched 33 miles in a westerly direction to Shirahan; on the 23rd, 46 miles, to Serik; on the 25th, 28 miles further, to an unnamed halting-place; and the next day 27 miles to Hukim. As at this point he begins his description of the villages and fort of Minâb, it may be inferred that he has fairly reached his destination; but the distance (134 miles) is twelve miles short of that estimated by Mr. Preece. It is highly probable that while the latter calculated his march to the British telegraph station overlooking the sea, Captain Grant took his distance from the town or village of Jashk, which is some miles inland. In this case there would be observable but an unimportant discrepancy.

There is no doubt that Guz and Gero, two stations mentioned by Grant, are the Gez and Geru of Preece.

Floyer, starting from Jashk, on his way to Persia, passed very close to Minâb, but he had first made a detour to Anguran in Bashakard, which took him off the track of the other travellers.

One of his stations, however, Geigan, is certainly Mr. Preece's Gangân.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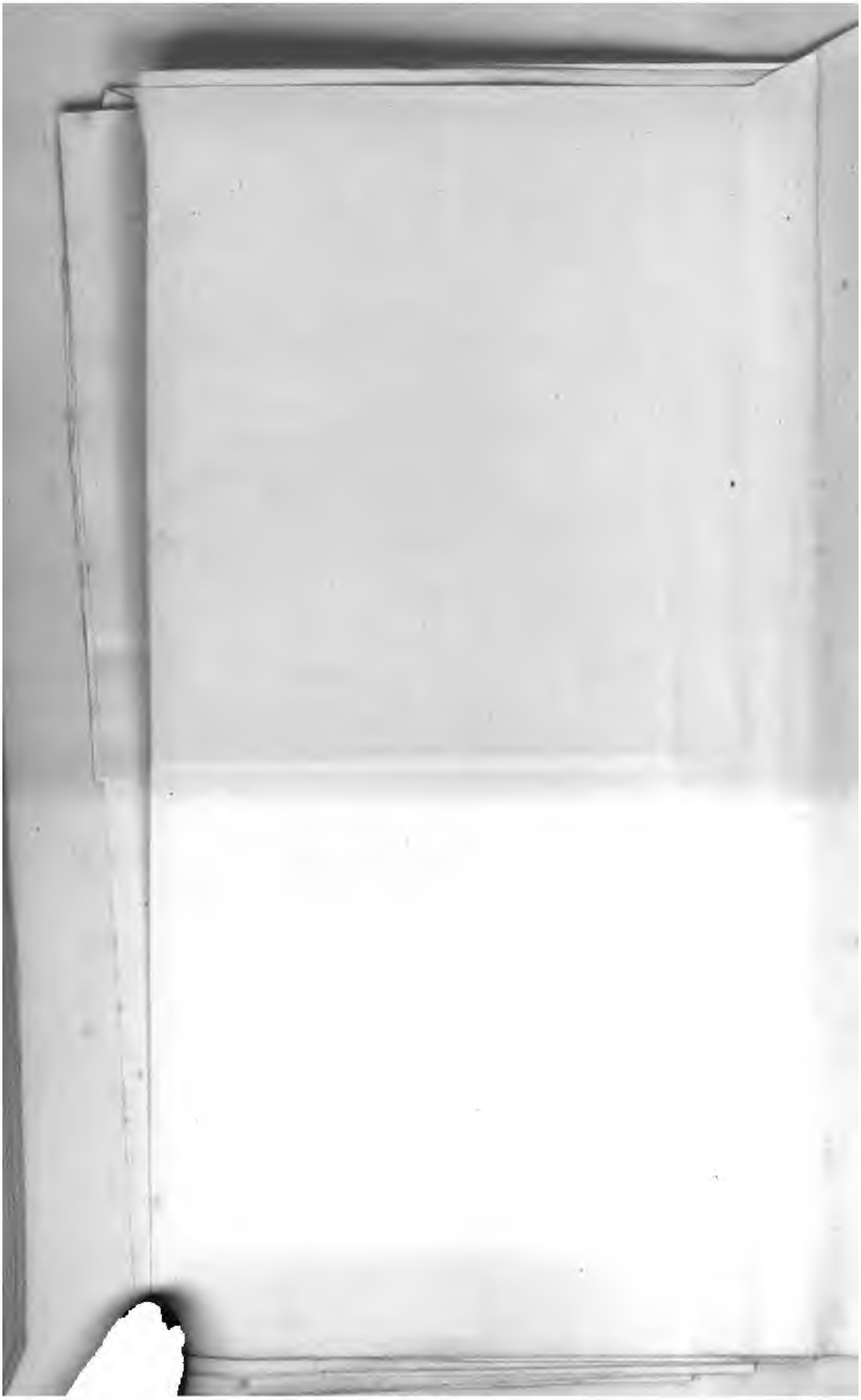

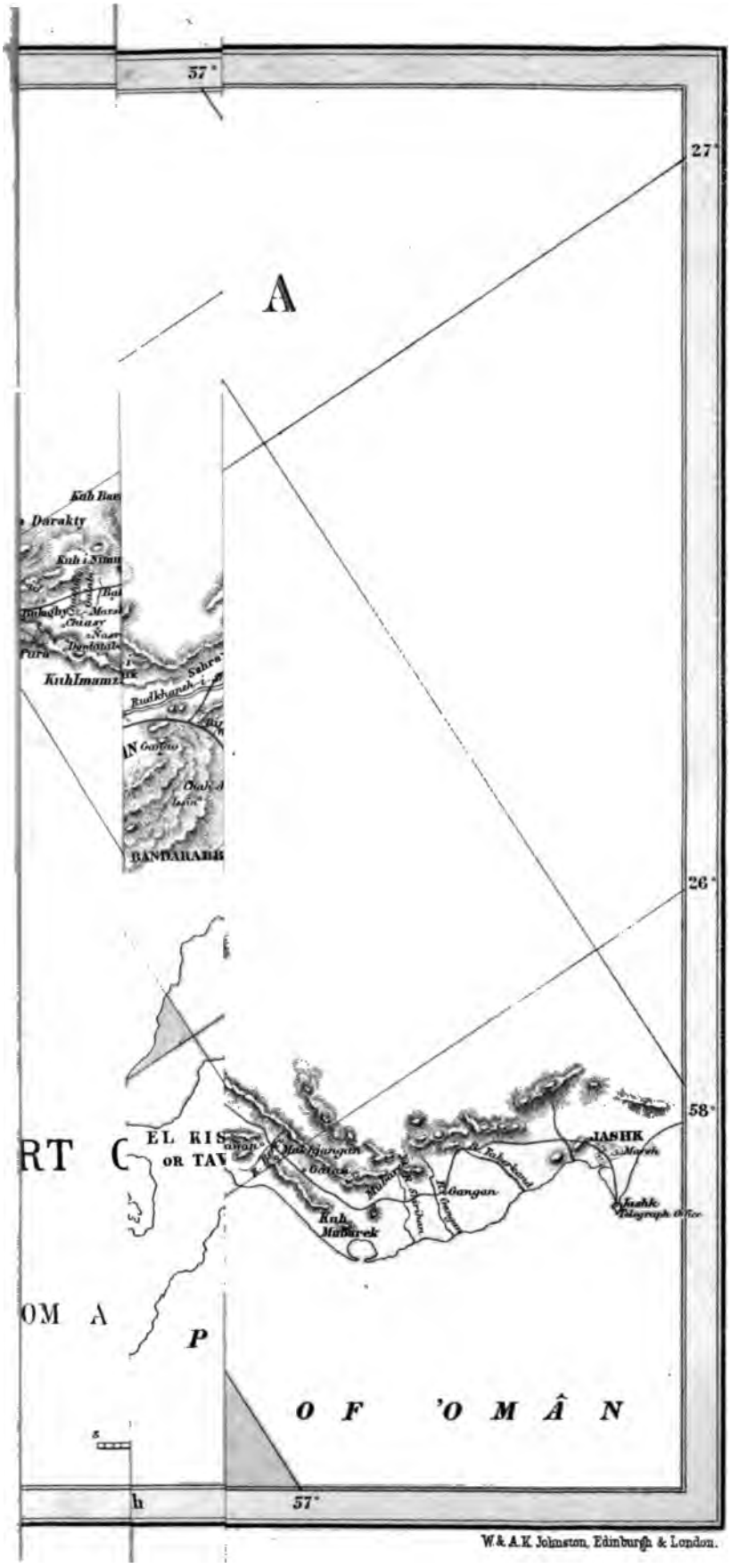


W. & A.K. Johnston, Edinburgh & London.

# GEOGRAPHICAL EDUCATION.

## REPORT TO THE COUNCIL OF THE ROYAL GEOGRAPHICAL SOCIETY.

By J. SCOTT KELTIE,
THE SOCIETY'S INSPECTOR OF GEOGRAPHICAL EDUCATION.

TO THE COUNCIL OF THE ROYAL GEOGRAPHICAL SOCIETY.

GENTLEMEN,

I BEG herewith to submit to you a Report of the work I have done as the Society's Inspector of Geographical Education.

I have the honour to be,

Gentlemen,

Your obedient servant,

J. SCOTT KELTIE.

1, *Savile Row, London,*

*May* 17, 1885.

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# REPORT.

## INTRODUCTION.

THE following copy of the Memorandum, which was drawn up for my guidance, will explain the object which the Council had in view in undertaking this inquiry, and the special points on which they desired information.

The object of the Council in appointing an Inspector of Geographical Education is to obtain fuller information than they now possess regarding the position and methods of Geographical education in this country and abroad.

I. As regards the United Kingdom—

A. The Inspector will ascertain, by means of correspondence or by actual inspection: (1) the extent to which Geography of any kind is taught in our Universities and public schools, and what special rewards are offered for proficiency in it; (2) the actual subjects taught under that name, and the comparative time allotted to them; (3) the methods and appliances used in teaching these subjects; (4) the attitude of teachers and professors with regard to Geography generally; (5) the value allotted to Geography in University examinations, and with what subjects it is united.

B. The Inspector will consult the Reports of the Examiners for the R.G.S. Public Schools Medals.

C. He will ascertain the comparative position of Geography in the examinations for the English Public Services, and will acquaint himself with the experiences of their examiners.

II. As regards the Continent of Europe—

The Inspector will be expected to visit Germany, Austria, France, Switzerland, Italy, Belgium, Holland, and Sweden. In making his inquiries on the Continent the Inspector should keep the following points in view:—

A. The position allotted to Geography, especially in High Schools and Universities, as shown (1) by the extent to which it is taught, the maps and other appliances provided, and the rewards offered in it; (2) by the time allotted to it as compared with other subjects; (3) by its comparative value in examinations; (4) by the comparative number, status and emoluments of Professors of Geography in Universities, as compared with those of Professors of other subjects; (5) by the attendance of students in the geographical classes.

B. The extent of the field covered by geographical teaching in High Schools and Universities, and the standpoint from which geography is taught,—

whether (1) from that of physical science; (2) from that of history and politics; or (3) from that of commerce.

C. The methods of instruction adopted at various stages from the primary school upwards. Whether the subject ever attains the position of a discipline, as distinguished from a mere exercise of memory; whether it has been found possible to set habitually geographical problems for solution. Also the methods adopted in teaching pupils to read maps.

III. As regards America—

The Inspector will ascertain, by correspondence with the proper authorities, the condition of Geographical Education in the United States of America.

IV. In the prosecution of his inquiries, both in the United Kingdom and abroad, the Inspector will collect specimens of the best text-books, maps, globes, diagrams, models, and other apparatus used in teaching the various branches of Geography. These he will arrange and classify on the Society's premises, for the information of the Council. Where it is impracticable to obtain specimens, the Inspector will report upon such contrivances as seem to him effective aids to geographical instruction, or to developing the geographical imagination.

V. On the conclusion of his inquiries, the Inspector will prepare a Report embodying (1) a summary statement of the work done by him; (2) The results of his inquiries in the various directions indicated above; (3) The steps which he would recommend the Council to take in order to improve and extend geographical education in the United Kingdom.

*July 26th*, 1884.

I began operations immediately after my appointment, by entering into correspondence with those likely to be of service to me in accomplishing the Council's purpose. After the reassembling of the schools in autumn I began the work of visiting, which I have carried on at intervals up to the present date. The months of November and December, 1884, and April, 1885, I spent mostly on the Continent.

I have found everywhere the greatest readiness to co-operate with me in prosecuting this inquiry. In this country I have been received with courtesy and in many cases with sympathy. Information has been generally most willingly accorded, and exceptional facilities afforded me for personal inspection of schools of all classes. To those who have thus given me their assistance, I can only tender my best thanks in the name of the Council; I cannot attempt to give their names.

On the Continent I was welcomed with cordiality proportionate to the greater interest taken there in geography and geographical education. I have specially to acknowledge the courtesy of their Excellencies the French Ministers of War and of Education, for according me permission (through the Consul-General of France in London) to visit the establishments under their departments; His Excellency General Bronsart von Schellendorf, Prussian Minister of War, for permission to visit the Kriegs-Akademie, Berlin; the Belgian Ministry of Public Instruc-

tion, for valuable documents placed at my disposal; the Heads of the General Staffs of Austria and Belgium, for allowing me to inspect the cartographic establishments and operations of these countries; Colonel Niox, for kindly conducting me over the School of War in Paris; M. Gréard, Vice-Rector of the University of France, for much useful guidance and information. I have also to acknowledge valuable services rendered me by Professor H. Wagner, of Göttingen, probably one of the greatest living authorities on geographical education; Professor Baron von Richthofen, of Leipzig; Professor Rein, of Bonn; Professor Kirchhoff, of Halle; Professor Kiepert, of Berlin; Professor Partsch, of Breslau. Also Dr. W. Reiss, President of the Berlin Geographical Society; Professor Virchow, Dr. Bastian, Dr. Marthe, and Dr. Jagor, of Berlin. In Paris I received much useful aid from M. Maunoir, of the Paris Geographical Society; M. James Jackson, Librarian of that Society, who put himself to much trouble on my behalf; Professor Himly, of the Sorbonne, and Professor Levasseur, of the Collège de France. In Vienna, Herr Hugo Hölzel arranged everything for me; and I must also refer to the courtesies of Professor Simony, General Crusič, and several members of the Vienna Geographical Society. In Italy, I was much indebted to Professor Cavaliere Guido Cora; as also in Switzerland, to Professor Heim, of the Polytechnic; Herr Kappeler, Director of the Polytechnic; the Director of Education in Zürich; and Herr Koller, Sekundarlehrer. In Brussels, Professor du Fief was of the greatest service to me; in Amsterdam, Professor Kan; while for Scandinavia, Baron Nordenskjöld, Dr. Dahlgren and Mr. Brœkstad have done much to help me. In the United States, the Hon. John Eaton, Director of the Education Bureau, has instituted an extensive inquiry on behalf of the Society; and I am indebted to the courtesy of W. Macpherson, Esq., H.M. Consul at Madrid, for an interesting statement with reference to Spain. There were many others from whom I received assistance; and some of their names will come up in the course of the Report.

Geographical publishers, both in this country and on the Continent, have shown perfect willingness to send specimens of their best productions to the Exhibition of Geographical Matériel used in education; the collection has increased considerably beyond what was originally contemplated. Any special remarks I may have to make on apparatus I shall reserve for the Catalogue.

## GREAT BRITAIN.

*Institutions dealt with.*—In our own country, I took as my guide the list of schools invited to compete for the Society's medals; for these may be taken to fairly represent our higher class schools, the class

which I believe the Council had mainly in view in instituting this inquiry. The list of such schools dealt with will be found in the Appendix (A). I have further obtained information as to the position of geography in normal and primary schools, in the various training institutions for the Army and Navy, and in the examinations for the public services. I have also endeavoured to ascertain the attitude of our principal Universities to the subject, especially those of Oxford and Cambridge.

In this way, I have dealt with somewhere about eighty representative Educational Institutions. My method of procedure has been to communicate with the heads of the Institutions, sending them the President's Circular Letter, the Memorandum of Instructions, and a list of questions which I drew up, mainly to serve as a guide to the points on which information was desired. With scarcely an exception, I have got fairly full replies to my inquiries.

At the same time I selected a certain number of schools, which seemed to me representative, for the purpose of inspection; these are marked with an asterisk in the Appendix (A). In nearly all cases, indeed, I asked permission to visit the schools should I deem it advisable; and invariably I was made welcome to do so. True, in not a few instances, the head-masters confessed that I should learn nothing by actual inspection, either because they considered it a fallacious method of obtaining information, or because they had told me in writing all that was to be learned, or because the subject had admittedly only a pariah's place on their programmes. In most cases I not only had instructive interviews with the masters, but actually saw the classes at work, and inspected the stock of apparatus in use.

*Previous Efforts of the Council.*—The Council did not require to institute this inquiry in order to discover that the position of geography in most of our public schools and in the Universities is unsatisfactory. That fact has been known for years, and the Council have taken various steps to obtain such recognition for geography in English education as it deserves. In 1869 the Public Schools Medals were instituted, and were continued for sixteen years, until in 1884 the Society was induced to discontinue them by the unsatisfactory nature of the results. As a matter of fact, the sixty-two medals offered by the Society in sixteen years were awarded among only sixteen schools; and of these sixteen schools two (Dulwich College and Liverpool College) carried off thirty. I need only refer to the series of lectures which were given, under the auspices of the Society for three successive years, by eminent specialists in various departments of science related to geography; to the letter addressed to the Vice-Chancellors of Oxford and Cambridge by the President and Council in 1871, with reference to the Universities Schools Examinations, in connection with which the Society continues to award

medals for the Geography papers; and to the Memorial sent to the University Commissioners and to the Governing Bodies of the Universities in 1874. Extracts from these I think it well to reproduce in the Appendix (B), as they state the case fairly and ably on behalf of geography both for schools and Universities.

This brief retrospect shows that the Society has deemed it its duty for many years past to exert itself for the improvement of geographical education. Its efforts have not been altogether unsuccessful; the subject certainly has a place in the programmes of the Oxford and Cambridge Schools Examinations, which, I believe, have done much to improve the position of geography in middle-class schools; and in several schools, at least, the Society's medals have acted as a stimulus to improved teaching.

*Primary Schools.*—Since the State undertook the charge of elementary education, the position of geography, as of other subjects in primary schools, has greatly improved. Geography has been made compulsory, and must be taught according to a generally prescribed method which, if carried out everywhere with intelligence and enthusiasm, would be nearly all that could be desired. Under some of the School Boards, such as those of London, Birmingham, Edinburgh, and Glasgow, great progress has been made, to a considerable extent on the basis of what is known in Germany as "*Heimatskunde.*" (See p. 39, and Appendix K.) In each of the London Board Schools, for example, there are a special map of the neighbourhood of each school, a map of the division in which the school is situated, and a map of London and its environs. Too much importance, it seems to me, still attaches to books, and too little to good large-scale wall-maps, geographical pictures, good reliefs, accurate and carefully-executed sheet-maps or atlases, and the living voice of the teacher himself. In some of the Board Schools visited by me, I found individual masters who took a real and intelligent interest in the subject, and who put themselves to some trouble to devise methods and apparatus that might attract the interest and draw out the intelligence of the pupils. In some schools we find large-scale maps of the surrounding district, relief maps of various kinds, not always of a satisfactory character, large wall-pictures of a geographical nature, specimens of products, mineral and vegetable, raw and manufactured, not to mention, as a rule, a fair stock of wall-maps, which, in number at least, are in marked contrast to the empty walls of most of our great public schools. More than ten years ago Sir Charles Wilson, in his address at the Dublin Meeting of the British Association, pointed out the great importance of having the Ordnance Survey maps of school districts hung up in the schools.

In Appendix B* will be found the programme prescribed by the Education Department for instruction in geography, and here I quote the directions as to how the programme should be carried out, contained

in the Revised Instructions to H.M.'s Inspectors, 1885, directions which might be studied with advantage by teachers of all grades :—

"Geographical teaching is sometimes too much restricted to the pointing out of places on the map, and to the enumeration of such details as the names of rivers, towns, capes, and political divisions. It is hardly necessary to say that geography, if taught to good purpose, includes also a description of the physical aspects of the countries, and seeks to establish some association between the names of places and those historical, social, or industrial facts which alone makes the names of places worth remembering. It is especially desirable in your examination of the fourth and higher standards that attention should be called to the English colonies, and their productions, government, and resources, and to those climatic and other conditions which render our distant possessions suitable fields for emigration and for honourable enterprise. In order that the conditions laid for the geographical teaching of the lower classes may be fulfilled, good maps, both of the county and of the parish or immediate neighbourhood in which the school is situated, should be affixed to the walls, and the exact distances of a few near and familiar places should be known. It is useful to mark on the floor of the schoolroom the meridian line, in order that the points of the compass should be known in relation to the school itself as well as on a map."

But, as the Society's inquiry is concerned mainly with our great public schools and universities, it is unnecessary to dwell upon the position in our primary schools.

*High and Middle-Class Schools.—General Position.*—In all the schools concerning which I have obtained information, either by correspondence or by direct observation, and which may be taken as representative of the mass of English public middle-class and higher schools, geography, or what passes under that name, has at least a nominal place. The general reply given to my inquiry as to whether the subject was compulsory, and, if so, up to what form, has been that it is, and up to about the third or fourth form, or in the lower half of the school. The time nominally allotted to it may be taken as on an average 1½ hour per week, varying in different classes and different sections from 1 to 2½ hours, as contrasted with an average of 8 to 16 hours to classics, and 4 to 8 to mathematics. This, it should be remembered, is what is usually known as political geography, with which there seems to be sometimes mingled what is popularly regarded as special physical geography—names and situations of mountain ranges, river courses, coast features, and such-like. The teachers of this kind of geography are invariably the ordinary class-masters—men who, as a rule, have had only a classical training. It sometimes happens that a class-master has a particular liking for the subject, and takes some pains to master it, and to devise effective methods of teaching it. When this is the case the subject under his hands assumes considerable importance. Probably in about eight of the schools in the list in the Appendix, the subject, in all its phases, is fairly well taught throughout the school, and, in four or

five of them, it is nearly as well taught as in a German Realschule. In one of them it is so taught that the boys in the school are expected to give answers to the paper in Appendix (C, No. 1), a paper in which even a professional geographer might be plucked, if he had not been coaching himself in the subject immediately before. In another, on the Modern side, such papers are set as will be found in Appendix (C, No. 2).

With very few exceptions there exists no general plan, whereby it is secured that the pupils who pass through the entire curriculum of a school, shall have a complete course of geographical teaching, embracing the elements of the various departments of the subject, and the special geography of all the continents and their sub-divisions, not to mention that of the oceans. In one of our greatest public schools it seemed to me that a boy might pass through the complete curriculum and never get a single lesson in geography, and at best the instruction he might get would be fragmentary and meagre. I must say, however, that in certain lower middle class schools, and especially in some of the Scotch schools, attempts are being made, as far as an over-crowded programme and other discouragements will admit, to give the subject a substantial place, and to teach it after a systematic method and with approximate exhaustiveness. The most complete programme that has been sent to me comes from a Glasgow school; and I therefore give it in the Appendix (D), where also will be found the brief programme which has been drawn up by Mr. J. Robinson for Dulwich College. But, even when the subject is on a fairly satisfactory footing, teachers often seem to me to be groping in the dark; they have only a vague notion of the varied and interesting field embraced in the subject; have seldom had any training in the best methods of teaching it; and almost uniformly complain of the dearth of satisfactory text-books, good maps, and other apparatus.

To my inquiry as to the field covered by each department of geography, the subjects included in physical and in political geography, replies were often returned which showed that the teachers had but a very inadequate conception of what geography really is. A few seemed quite aware of the width of the geographical field, and alive to the educational value of the subject both as a body of knowledge and as a discipline; but admitted that it was impossible for them to teach it otherwise than in the old-fashioned humdrum way, as consisting of so many names to be learned by heart, and so many places to be pointed out on the map.

The following statement by the head-master of one of our greatest public schools, may be taken as representing the position in schools of that class:—

"Except in the two lowest forms, we have no systematic geography teaching in the school; that is, there are no definite lessons given in geography, nor any separate masters for geography. History is taught throughout the school, and into

the history lessons as well as the classical lessons a certain amount of geography is introduced, but only incidentally. In two out of the three terms of the year, a course of teaching in physical geography is carried on; this course may be considered as partly scientific, partly geographical. In the two lowest forms of the school, two short lessons a week are given in geography by the ordinary form master. We also require a certain amount of knowledge of geography at an entrance examination, and set a paper on geography for our scholarships, with a view to encouraging the teaching of geography at the preparatory schools.

"No regular text-book is used; but the boys are instructed to study some particular country or part of a country in whatever way they can, and a catechetical lecture is given on the district by the master. The various countries of Europe alone are ordinarily taken. The boys are required from time to time, say once a fortnight, to draw maps of the countries they are studying; and considerable credit and marks are given for these maps.

"I ought to add that occasionally we set a subject of geography as a holiday task, to be studied in the Christmas holidays, and an examination is given in this subject immediately after the boys return to school.

"I cannot say that, with our provisions here, there is any guarantee that a boy on leaving the school would carry away a satisfactory knowledge of geography. In the multiplicity of subjects we teach, geography does no doubt somewhat get crowded out; and I doubt the possibility of teaching it effectively all through the school without a regular 'master in geography,' and more elaborate arrangements than at present we see our way to making."

*Geography does not "pay."*—On the whole, I am bound to admit that the unsatisfactory position allotted to geography in our public schools is not so much the fault of the teachers as of the conditions upon which they are compelled to regulate their programmes and their methods. A perusal of the statements in the Appendix (E), in which many head-masters have favoured me with their views on the geographical situation, will give the conviction that the present position of geography in our public schools is almost entirely due to the exigencies of examinations. Geography, we are told in so many words, does not "pay." It is not recognised at the Universities by either professorship or readership; it does not find a real place in any of their examinations; while in the Army and Navy examinations it is at a discount, and such geography as is given is of a very partial character, and is left mainly to crammers. The head-master of one of our oldest public schools told me he deliberately warns his pupils to keep their eyes steadily fixed upon the examinations they have in view, and the careers for which they are destined, and to neglect every subject, including geography, which in that view will not pay.

"There can be no doubt of the practical or educational value of geography, no doubt of the great interest attaching to its study," writes to me the head-master of one of our greatest public schools, and a recognised authority on all matters pertaining to education. This master has himself, both in his present and former school, offered a special prize yearly to encourage the study of the subject, and he evidently promotes

it as far as the conditions under which he is bound to work admits, Another head-master of a school in which geography is unusually well taught, writes—"Geography can be made an extremely valuable and interesting educational instrument, and there is scope for it in 'modern schools;' but it is not made the most of at present, even there. Examining bodies might do much more than they do at present to insure that the subject is new as an intellectual discipline. 'University' examiners are quite in the dark as to the capabilities of this subject." "The subject," another head-master writes, "will never be taught as a special subject at English schools till it is better recognised at the Universities."

This may be regarded as pretty fully summing up the whole matter. There is no encouragement to give the subject a prominent place in the school curriculum; no provision, except at elementary normal schools, for the training of teachers in the facts and principles of the subject, and in the best methods of teaching it; no inducement to publishers to produce maps, globes, pictures, reliefs, and other apparatus of the quality and in the variety to be found on the Continent; while our ordinary text-books are, with few exceptions, unskilful compilations by men who have no special knowledge of their subject. In short, in the present condition of things, it is thought that geography, like English, can be taught by anybody.

In the few cases where I find masters anxious to give the subject its proper place, it is evident that they work under considerable discouragement, and often with want of knowledge. I have found individual masters here and there who do their best to elevate the subject above the wretched position it has hitherto occupied. I find them resorting to all sorts of contrivances for lack of good apparatus—making their own maps, or sending to the Continent for good maps in dissatisfaction with those procurable in this country. In the very rare cases in which the head-master of a school has a full appreciation of the importance of the subject, it is generally fairly well taught, as far as other and more payable subjects permit. But all this goes to prove that the subject has no recognised place in our great public schools; either it is regarded as too elementary, too trivial, a thing suited only for a dame's school, or it is deliberately snubbed in favour of the subjects that "pay." One of the best and most successful teachers of geography in this country assured me that the head-master (a purely classical man) and the assistant masters bring the strongest pressure to bear on the boys to give up geography entirely; and he fears they will succeed.

"*Physical Geography.*"—In those schools which have a modern or science side "physical geography" is one of the subjects usually taught, and not unfrequently well taught. Such physical geography is, as a rule, what is known in Germany as "Allgemeine Physische Erdkunde,"

and is indeed often geology, and little more. I find again in not a few instances that what is really taught under the name is "physiography," with Professor Huxley's well-known manual as a text-book. In such schools the pupils at some stage of their course get a certain amount of teaching of this kind; and if at a later stage they choose the modern side in preference to the classical side, and go in for geology, they will be carried still further in general physical geography. Thus, a certain amount of physical geography is actually taught on the modern side of most public schools of good standing, taught sometimes as a compulsory subject to the pupils at a certain stage, or as a voluntary subject to those who select it as their special study. There can be no doubt that the institution of science scholarships at Oxford and Cambridge has had some influence in this direction, as in these, geology at least, occasionally finds a place.

In some of those schools—about half-a-dozen of those on the list—from which pupils proceed to Army examinations, there is generally a special class for their benefit; and as "geography and geology" finds a place as one subject in these examinations, the combined subject enters into the curriculum, and, considering the general position of geography in this country, the standard demanded in these entrance examinations is fairly high.

At the best, however, only a fragment of the whole subject finds a recognised place alongside other "modern" or science subjects in our public schools. To what is considered physical geography proper ¾ to 2½ hours a week may be given when its turn comes as a science subject.

Geography in the general acceptation of the term, including special political and physical geography, is almost invariably in the schools with which I have dealt, left to the ordinary class-masters, and these are as a rule, as I have said, classical masters. They are expected on the lower forms to give on the average one hour a week to the subject, generally accompanied by exercises in map-drawing. Here, again, the extent and method of teaching depends entirely on the master. If he does not care for the subject, he either does not teach it at all, or simply goes through the form of teaching it. In short, except what is included, as above indicated, under physical geography, the subject can hardly be said to have a serious place in the bulk of our great public schools.

*Geography should not be broken up.*—The separation which at present exists in most middle and higher schools between the different sections of geography seems to me to be mischievous. We do not find the general principles of chemistry separated from the great body of phenomena to which they are applicable; botany and zoology are not divided up, and relegated to different sections of a school and to different masters. I do not mean that the different sections of geography should necessarily

be taught by one master. There would not be much harm in having general physical geography taught by the science master, and political and special physical geography by a properly qualified class-master. But the two sections should be taught according to a common programme, a programme so constructed that the intimate connection between the matters treated of in the different sections would be clearly brought out and impressed upon the pupils. Were geography taught by qualified teachers as one single subject, all the parts of which are intimately connected, it would not only form a body of knowledge of high value, and cease to be the barren task which it is as now taught, but it could not fail to become a real discipline. As taught in German higher schools and universities, it not only borrows from all other sciences, but is made to render valuable service to many other fields of inquiry. Political geography, as it is called, is the result of the interaction which takes place between man and his physical surroundings; and were teachers competent to show the connection between cause and effect in this respect, geography would become a very different subject of study from what it is at present. The only serious attempt to work out a geography on this basis that I know of in this country, is the late Mr. Green's 'Short Geography of the British Islands.' It is not a very examinable book under the existing conditions of examination in this country, and, as a consequence, it has not made much way in schools. It is a book which old and young may read with pleasure and profit, which is much more than can be said of almost any other English text-book. Only one out of the many schools from which I obtained returns is it given as a class-book. The late Professor Hughes, it will be seen from the preface to one of his text-books, had a sound notion of the intimate relation between physical and political geography, though it cannot be said that he carried his idea out very thoroughly in actual practice. I do not find such an inadequate idea of geography to exist in any country of Europe that I have visited; but then there is proper encouragement in those countries to treat it seriously and scientifically.

*Geography and History.*—I found in not a few instances a recognition of the indispensability of geography to a thorough understanding of history. One eminent historian, a master in one of our most famous schools, told me that more than half of his history-teaching is geography. Professor Freeman and the late Mr. Green have had much to do in demonstrating this intimate connection between history and geography. Professor Freeman's 'Historical Atlas' is well known, and the school edition of Spruner's 'Historical Atlas' has a considerable circulation in this country. Probably there is no department of knowledge in which geography is calculated to throw more light than on history; for is not history, in its completest sense, the result, to a large extent, of the interaction not only between man and man, but between man and his

physical surroundings? So we find in France the custom (happily being done away with) of combining chairs of geography and history under one professor; and this has also been the case in Germany. But invariably it is found that under such circumstances history becomes everything, and geography nothing, not even much of a handmaid to history. The tendency now is to entirely separate the two subjects, and place each in the hands of a distinct professor.

*Prizes.*—In a few schools, special prizes are given for proficiency in geography. Lady Stangford's prizes at Harrow, for instance, excite considerable interest among the boys; but those who go in for them have to be specially coached. The standard aimed at in the papers is certainly high, and were the school as a whole led up to it the most exacting geographer should be satisfied. Specimens of the examination papers will be found in the Appendix (F). On an average from 30 to 35 boys, I am informed, go in for these prizes. At Eton the governing body award a prize for physical geography and geology. The subjects included and the standard aimed at will be seen from the papers given in the Appendix (F). At Rugby the head-master gives a prize for competition on a special subject or book, but as a rule not more than a dozen boys present themselves. The list of subjects thus set at Rugby in recent years will be found in the Appendix (F). Such prizes no doubt help to keep the subject alive and up to a fair standard; but I do not find they have any great influence on the position of the subject in the school generally. Under a satisfactory programme, such prizes given for competition in class-work would be of real service.

*Methods and Apparatus.*—As to the methods and appliances used in teaching geography in English high-grade schools, they might almost be described as the naval officer described the customs and manners of the savages he visited,—the appliances are bad, and as for method, there is none. In elementary schools both methods and appliances have greatly improved, along with the improved position of the subject. A visit to the store of the London School Board would in itself be an education to teachers of higher schools who desired information as to the appliances within reach of those desirous of improving the geographical position. In certain of the girls' schools modelled on the type of the North London Collegiate School, much has also been done to improve both appliances and methods. Map drawing one finds in nearly every school; but that is seldom more than child's play. The great object of map-drawing, in my estimation, should be to train the pupils to read or interpret the features of ordinary maps. But the principles of cartography are scarcely known among the teachers of this country, and rarely well illustrated in the maps in general use. Neatness and not accuracy is mostly aimed at. Any kind of vague

scratching serves for a mountain; the principles of hill-shading, easily enough learned, are not at all understood. The only purpose served by such map-drawing is that the situation of a few places may be impressed on an attentive boy's memory. Maps are given out to draw, but as these are generally copied, perhaps by means of tracing paper, from another map, the exercise counts for very little. In one well-known school I found that map-drawing was relegated to the drawing-master, who naturally judges the result from his own artistic point of view. In another school the map to be copied is placed on a pane of glass, behind which a fag holds a candle, while the industrious pupil copies his exercise on a sheet of paper laid over his copy. Anything like the precise and careful map-drawing generally insisted on in Germany is probably not to be found in England.

I found in one or two schools a free use made of the black-board with coloured chalk, to sketch the special features of a region before the pupils. In one school, all the rooms are lined with black-boards, at which the pupils stand and do their work under the eyes of the teachers. I was present at an interesting lesson in Mathematical Geography in the school, the pupils working out an elaborate problem on the boards. In other schools—a ladies' school and an elementary school, I must say—sand was used to excellent purpose in building up the salient features of a country. In Manchester Grammar School, one of the masters, with a genuine love of his subject, has devised what at first sight seems a burdensome, but in practice, I believe, a successful method for accomplishing memory work. He makes his pupils learn by heart, and with constant reference to the map, the latitude and longitude of all the principal places and natural features of the various continents; and exercises them in drawing from memory maps of particular regions defined only by the parallels and meridians. Thus, in my presence, a class of about thirty boys drew a map of the regions between 30° and 90° east longitude and north of the Equator. The maps thus drawn will be found in the Exhibition. Other teachers have made considerable collections of photographs, which are constantly used to illustrate the lessons. But with rare exceptions there is a complete want of any general, well-devised, and effective method of teaching geography in this country; the natural result of its unsatisfactory position in education.*

*Maps.*—In a very few of the great English public schools will be found a good store of the best maps procurable in this country, and here and there a few of the best maps issued in Germany and France. At Dulwich, as might be expected, the stock of apparatus, physical and

* Since the above was written, I learned when in Aberdeen that a very admirable system of teaching geography exists in Gordon's Hospital in that city. Among other things the pupils are taken out to the country, and in a simple, rough, but effective, and to them interesting and instructive way, are taught to draw maps of a small area for themselves.

political wall-maps, globes, &c., in the upper school is abundant, and has been selected with intelligence. At Charterhouse considerable pains have been taken to provide the school with an ample supply, not only of the best school wall-maps, but in the library with excellent library maps, easily accessible to pupils desirous of consulting them. In other schools, of a somewhat lower grade, those in which the bulk of the pupils do not look forward to the Universities, but to commercial and non-"liberal" pursuits, and whose programme is regulated to some extent by the Universities' Local Examinations, and where the head-master or one of the assistants has an intelligent enthusiasm for the subject, I find a fair stock of maps, not always selected with knowledge. In most schools, however, the supply of apparatus is on a par with the position of the subject. In one of our oldest and most celebrated public schools, I could find only two maps; one a large map of the Dominion of Canada, presented by the High Commissioner, ornamenting one of the passages, and another wretched school wall-map, exhumed after much searching from a remote recess. In another school with a great reputation, and in which physical geography is well taught, a few dusty maps, mostly out of date, were brought out from a closet. In not a few schools I find a fair stock of classical maps, mostly Kiepert's, with a meagre supply of poor modern maps. In most schools there is no systematic provision for procuring maps; if the assistant masters want them they must make them or buy them. The result is what might be expected. A school with from a dozen to twenty maps would consider itself amply stocked. As to the beautiful and accurate and attractive geographical pictures, ethnological pictures, reliefs, mineralogical, botanical, zoological, and industrial specimens, and other apparatus to be found even in elementary schools on the Continent, in such poor countries even as Switzerland and Italy, few teachers in England ever heard of them. At the same time I must confess that I found a very general complaint of the want of good apparatus in this country, and especially of satisfactory maps. There are indeed a few creditable maps produced by one or two good publishers in this country, especially since geography has assumed an important place in our Board Schools. But with rare exceptions, as will be seen from the specimens in the Exhibition, they are not to be compared in execution, precision, and variety, with the maps produced on the Continent.

Some publishers seem to think that the more eccentric their maps are, the more claim have they to originality and utility; they aim at making their publications as unlike as possible to the maps which the pupils will have to read when they grow up to be men and women—a fatal mistake in my estimation. Equally useless and misleading are some of the elaborate and ingenious combinations of globes to illustrate astronomical geography which we find produced every now and then. For the

more elementary stages, at least, the simpler the apparatus used the better; young pupils are apt to carry away the notion that all the parts of an apparatus represent the actual conditions. As to relief maps, these are making their way, especially in Scotch schools. Good large reliefs of limited areas, in which the two scales are as nearly as possible the same, are, in my opinion, of great service in geographical teaching; but relief maps of large areas, constructed and coloured, as I have seen some of those much advertised in this country, by unskilled mechanics, in which the scale of altitude is indefinitely magnified, are exceedingly mischievous except in the hands of a first-rate teacher. The chief use of reliefs, in my opinion, is to teach the student to read maps, and in several schools on the Continent, notably in the Cadet school of Wiener-Neustadt, and in Zürich, I have seen them used for this end with excellent results.

English publishers are scarcely to be blamed for the unsatisfactory condition of the map market; it is a case of supply and demand. If they found it would pay them to improve the quality and increase the variety of their maps and other apparatus, there is no doubt they would do so. As I have said, the improvement in elementary teaching of geography has had some good effect. But in this country there is not the market for high-class school wall-maps and atlases that there is on the Continent, and teachers, as a rule, are quite incapable of judging between good and bad maps.

I hope to write in more detail on the subject of apparatus generally in connection with the Exhibition Catalogue.

*Text-books.*—It is with text-books as with maps. So far as general physical geography goes, such manuals as those of Mr. Geikie and Mrs. Somerville leave little to be desired; but then these authors had complete knowledge of their subject. Of ordinary geographical text-books there is no end. Quite recently elementary manuals, modelled after those which in Germany are used for "Heimatskunde," have been introduced into elementary schools. This is hopeful. Geographical "readers" have also become common; and, when used only as an adjunct to the systematic teaching of the subject, they are of service. In the higher grade schools, some one or other of the ordinary familiar text-books are used. We all know their features. They are almost invariably compiled by persons who have no special knowledge of geography, for in this country it is believed that, as anybody can teach the subject, so anybody can write a text-book of it. Since teachers themselves are, as a rule, quite ignorant, and as in England we find none of the instructive manuals for the use of teachers to be found on the Continent, it is the duty of the compiler to put everything into his work, the most prominent features of which, as a rule, are long lists of names. The advanced manuals are thus far too bulky, and the kind of information given is of a superficial kind. I cannot do better than quote here the remarks on the common

text-books of geography to be found in the Introduction to Green's 'Short Geography of the British Islands':—

"No drearier task can be set for the worst of criminals than that of studying a set of geographical text-books such as the children in our schools are doomed to use. Pages of 'tables,—'tables' of heights and 'tables' of areas, 'tables' of mountains and 'tables' of table-lands, 'tables' of numerals which look like arithmetical problems, but are really statements of population; these, arranged in an alphabetical order or disorder, form the only breaks in a chaotic mass of what are amusingly styled 'geographical' facts, which turn out simply to be names, names of rivers and names of hills, names of counties and names of towns, a mass rarely brought into grammatical shape by the needful verbs and substantives, and dotted over with isolated phrases about mining here and cotton-spinning there, which pass for Industrial Geography. Books such as these, if books they must be called, are simply appeals to memory; they are handbooks of mnemonics, but they are in no sense handbooks of geography."

In Germany, except for University purposes, I do not find the bulky manuals to be found in this country. There the books are really text-books, furnishing pupil and teacher with a brief text for each day's lesson. For the teacher himself, as I have indicated, there are a number of special manuals furnishing him with abundance of rich and interesting information with which to supplement the brief statement in the text-book, his own knowledge, and what he is able to draw out of his pupils. Of course, for University purposes, we have such masterly and exhaustive treatises as that of Wagner's edition of Guthe, Peschel's 'Physical Geography,' Sonklar's 'Lehrbuch,' Suess's 'Das Antlitz der Erde,' &c., which will be found either in the Society's library or in the Exhibition. German text-books, and Continental text-books generally, are written by men who have had a special training in their subjects, just as chemical text-books and botanical text-books are written by trained chemists and botanists, and not by "anybody."

I found some teachers quite alive to the unsatisfactory character of text-books as well as maps, and who used them as little more than guides. They sought for their material in some of the large store-books available, such as Reclus's 'Géographie Universelle,' Stanford's 'Compendium,' books of travel and elsewhere; thus, in fact, making their own text-books, in the form of Catechetical lectures, after the method which prevails in schools on the Continent. Such teachers, having a fair knowledge of their subject and of its value, and a genuine liking for it, take some trouble to devise the best methods of teaching it, introducing all sorts of simple illustrations likely to instruct the pupils and impress the particular subject on their understandings and memories.

*The Universities' Local Examinations.*—From the Report of the Oxford Delegates for the Local Schools Examinations in 1884, it will be seen

that of the 639 senior candidates, 534 took the paper on Physical Geography, and 509 of them passed. This paper is included among the English subjects. It is also so included in the case of the Junior candidates, and is not specially referred to in the table of statistics, though it is to be presumed that most of the 1300 candidates (out of a total of 1333) who presented themselves in English took the paper, and of these 1015 passed. In the English group of subjects, candidates must select two, and may take three out of the following: (1) History, (2) Shakespeare, &c., (3) Physical, Political and Commercial Geography, (4) Political Economy. In almost all cases (1) and (3) are taken up. The Report of the Oxford Examiner in Geography for the 1884 examination will be found in the Appendix (F*). According to the Report of the Cambridge Syndicate for the same year, the total number of senior candidates (including those from the Colonies) at the Local Examinations conducted by that University, was 1688. Of these 1603 took "geography" as part of the English section, and 185 "physical geography" as one of the science subjects. In the Junior Division there were 6454 candidates, and of these 6124 took "history and geography" as part of the English section. In the Appendix (F*) will be found the report of the examiners in geography, as also specimens of the examination papers, which will afford some idea of the standard of geography aimed at by our University examiners.

Besides the above, there is also a joint Oxford and Cambridge Schools Examination Board, which annually examines about 60 of the best public schools in the country and grants certificates which exempt from the first University examinations in residence at Oxford and Cambridge; but the joint Board does not recognize geography as the subject of a distinct paper, which would go some way to explain the fact of the somewhat comtemptible position allotted to geography in our great public schools. Physical Geography and Geology is indeed one of the four subjects which can give the candidate a pass in the Natural Science section. The subject was taken up by 49 boys in 1884, by 40 in 1883, and is offered by about one-third of the science candidates. But a glance at the paper of questions in the Appendix (G*) will show that it is geology, rather than geography, which is the subject of examination. In earlier years the questions used to include about five out of twelve in Physical Geography.

*Geography as a School Subject.*—What geography might and ought to be as a subject of elementary education is so forcibly put in the Introduction to Green's 'Short Geography of the British Islands,' that I quote the passage here in full:—

"The study of geography, small as is the part allotted to it in actual teaching, is one which must occupy a foremost place in any rational system of primary education. When the prejudices and traditions of our schools and schoolmasters have passed away—as they must pass away before a truer conception of the growth

of a child's mind, and of the laws which govern that growth—the test of right teaching will be found in the correspondence of our instruction with the development of intellectual activity in those whom we instruct. The starting-point of education will be the child's first question. And the child's first question is about the material world in which it finds itself. So long as every sight and every sound is an object of wonder, and of the curiosity that comes of wonder, life will be a mere string of 'whats' and 'whys.' With an amusing belief in the omniscience of his elders, the child asks why the moon changes and what are the stars, why the river runs and where the road goes to, why the hills are so high and what is beyond them. To answer these questions as they should be answered is to teach the little questioner geography. Each of the divisions into which geography breaks does its part in his training, as the picture of the earth in which he lives grows into distinctness before him. He may never hear of physiography, but he learns in simple outline what are the forces that tell through heat and cold, or wind or rain, on the form of the earth, and make it the earth we see. The name of Physical Geography may never reach him, but he gets a notion of what the earth's form actually is, of the distribution of land and sea, of mountain and plain over its surface, of the relative position of continents and of countries, of the 'why' rivers run and the 'where' roads run to. As the structure of the world thus becomes distinct to the child he sees why races have settled, why nations lie within their boundaries, why armies have marched and battles have been fought, why commerce has taken one road or another over sea and land, and thus gathers his historical geography without knowing it. So as he watches how mountains divide men or rivers draw them together, how hill-line and water-parting become bounds of province and shire, how the town grows up by the stream and the port by the harbour-mouth, the boy lays the foundation of his political geography, though he never sees a 'table of counties,' or learns by rote a 'list of populations.'

"Studied in such a fashion as this, geography would furnish a ground-work for all after instruction. It is in fact the natural starting-point for all the subjects of later training. History strikes its roots in geography; for without a clear and vivid realisation of the physical structure of a country the incidents of the life which men have lived in it can have no interest or meaning. Through history again politics strike their roots in geography, and many a rash generalisation would have been avoided had political thinkers been trained in a knowledge of the earth they live in, and of the influence which its varying structure must needs exert on the varying political tendencies and institutions of the peoples who part its empire between them. Nor are history or politics the only studies which start naturally from such a ground-work. Physical science will claim every day a larger share in our teaching: and science finds its natural starting-point in that acquaintance with primary physics which enables a child to know how earth and the forms of earth came to be what they are. Even language, hindrance as its premature and unintelligent study has been till now to the progress of education, will form the natural consummation of instruction when its falls into its proper place as the pursuit of riper years, and is studied in its historical and geographical relations.

"Such a dream of education will doubtless long remain a dream; but even as a dream it may help us to realize the worth of geography and to look on the study of it in a grander as well as a more rational light than has commonly been done. It is at any rate such a dream as this that has encouraged its writers to attempt the present book."

*The Universities.*—It is generally admitted that the attitude of the Universities to geography has much to do with its present position in our great public schools. There is no professor of geography in any

University or University College in this country. The London University Examiners profess to examine in geography for matriculation, but the questions are bracketed with the History paper, and, as an authority informs me, "in 90 per cent. or more cases, are shirked or imperfectly answered." In Appendix (F**, No. 9) will be found the five questions (only two were allowed to be answered) set in 1881, which will give an idea of the London University Standard of Geography for young men entering on a University career. There were fifteen questions set in history.

There can be little doubt, indeed it is generally conceded, that if the Universities of Oxford and Cambridge recognised geography by giving it a real place in their examinations, it would have a powerful influence in exalting the position of the subject in schools. If, for example, the subject were introduced into the first stage of the degree examination (and it might be as well as arithmetic), the schools would be compelled to give serious attention to it.

I find in Oxford and in Cambridge, what I find in our public schools, that those who best know what the subject is as described in the Society's Memorial to H.M. University Commissioners (Appendix B), are those most anxious to see it take its place among the subjects encouraged by our Universities. The memorial shows how many-sided the field is, and how, in the hands of a thoroughly competent man, geography might be made to lend useful aid to several of the existing studies of the Universities, including even classics as well as history.

At Oxford the prospect is not so hopeful as at Cambridge, although, as a matter of fact, there is a lecturer in geography in connection with the Modern History School. Still those who would desire to see the subject introduced are compelled to admit that anything which has the semblance of science is looked upon with small favour at that University; that under existing arrangements students can afford to take only those subjects which tell in the examinations, and that the programme is already overcrowded. What is the actual geographical position at Oxford may be seen from the following statement, for which I am to some extent indebted to Mr. J. Frederick Heyes.

Geography is not at present looked upon as a distinct subject of study, but in the Final Honour school of Modern History the last paper out of about a dozen given is always on Historical Geography. In the Appendix (G *) will be found one set in June 1884. The only lecture on Geography given in the University is in connection with this paper in the History School, and a similar one in the Pass School, Group B. This lecture, one hour a week, has been given for many years by the Rev. H. B. George, M.A., F.R.G.S. of New College, writer of the well-known "Genealogical Tables in Modern History."

In the Final Pass School a candidate must pass in three subjects. One of these optional subjects is a portion of Modern History

in Group B. Two papers are given, one on part of Milman's 'Latin Christianity,' or Dyer's 'Modern Europe,' and the other on 'Geography.' In the Appendix (G*) is the paper set in December 1883. Moreover, as is pointed out in the memorial sent to H. M. University Commissioners (Appendix B), subjects have been set as Historical Prize Essays which are more or less of a geographical character.

Some years ago several new professorships and readerships were organised as the result of a Royal Commission, and the appointments have since been gradually made. Among them the University Chest had, I believe, to endow six readerships. Geography, it is stated, received a certain amount of consideration in connection with the memorial of the Council of the R. G. S. (Appendix B); but I am not able to say what were the cumulative reasons which resulted in this subject being shelved at the time. One good result was, however, obtained in the establishment of a readership in Anthropology—a new subject, which, in the hands of Dr. Tylor, immediately became successful.

Classical geography is expected in the Literæ Humaniores School, but classical geography in this country is an extremely meagre affair. The prevailing attitude towards the subject will be found very clearly stated in the letter from the Rev. H. F. Tozer, which is given in the Appendix (F**). Professor Freeman, as might be expected, admits the great value of geography to the historian, but cannot quite see how it is to be recognised as an independent subject of University teaching since on the one side a large section belongs to the historian, and on the other side the geologist claims a considerable section as his field. The same objection would hold against Art and Archæology, for which the Universities have recently made substantial provision. Another eminent Oxford historian, the late Mr. J. R. Green, did more than any other, probably, to show the vast, the indispensable services which geography may render to history, and his general opinion of the educational value of the subject I have already quoted above. I am glad to learn that in Oxford an effort is being made to introduce Strabo as one of the books for examination. Last October term, Professor Freeman gave a special lecture in "Geography and Travel": and when he was an examiner years ago, he always tried to do what he could for geography as a branch of history. As a matter of fact, simply because it is no one's business in particular to see that the geographical field is redeemed from the wilderness, it remains almost entirely waste.

What may be regarded as the attitude of many University men at Cambridge, who have no prejudice against the subject, is well stated in the letters of the Rev. Coutts Trotter and Professor G. H. Darwin, to be found in the Appendix (F**). At the same time I find that in a Report of the Special Board for Biology and Geology, dated February 6, 1883, there occurs the following passage among other suggestions there made:

"That University teachers should be eventually appointed in the following subjects: Agriculture, Anthropology, *Geography*, Metallurgy and Mining" (*University Reporter*, June 13, 1883, p. 885). "This shows," to quote the words of Professor Newton in a letter to me, "that some of us have been anxious to remedy the deficiency which we knew to exist." Professor Newton's views will be further seen in his letters given in Appendix (F**). None of the above proposed teachers have yet been appointed, mainly, I believe, from want of funds. Mr. Trotter informs me that in the examinations in certain subjects the geographical aspects are very often dwelt upon; and he seems to think that if this were done more regularly and more thoroughly it would be one effective way of encouraging geography at Cambridge. Professor McKenny Hughes also informs me that certain sections of physical geography and physiography form a regular part of his geological programme; and as a good example of the amount of geography generally attaching to geology in the Universities, I give an extract from his programme in the Appendix (F**). Professor Hughes has also kindly offered to bring the matter of the Society's investigation before the Special Board of Studies who are now considering the addition of new subjects to those already recognised in the Natural Science Tripos. The Council will be pleased to learn, moreover, that it is intended to supply the University Library with a complete set of the best maps obtainable, not only in England but on the Continent, so that no member of the University may be at a loss should he want to pursue the cartographical aspects of his subject to its limits. These seem to me hopeful signs, and I believe were any precise and definite proposals brought before the University authorities by the Council, they would be seriously considered. I say "definite and precise," because no mere general representation of the value of geography as a University subject could be of avail to a body whose functions are of the most practical kind. They would require to have before them an approximately precise definition of the field which the Council would propose to allot to any professor or reader in geography. With such a definite basis to start from, the University authorities could consider the bearings of the subject on other already established subjects; be able to make up their minds whether any further recognition of geography than already exists were advisable; and if so what modifications of the Council's proposals were necessary in order to co-ordinate the subject with those departments to which it is related. At the best, however, I am assured there are no funds at present for the establishment of chair or lectureship; though if effective representations were made by the Council, the geographical aspects of such subjects as are capable of it, might be more prominently brought out than they are at present. May I suggest the possibility of the Rede Lectureship being made the medium of enlightening the University as to the field of geography and its value as a University subject? Should any such proposal be entertained by those

whose duty it is to appoint the lecturer, it would not be difficult for the Council to indicate a geographer capable of effectively discharging the function.

From the communications in the Appendix (F**) from Owens College, Manchester (Victoria University), it will be seen that there also geography is not entirely neglected either on the geological or historical sides. Indeed, a joint series of geographical lectures has actually been organised, and if steps were taken somewhat similar to these which have been suggested as to Cambridge, more definite recognition of the subject might be obtained.

Surely it is the function of a University to encourage every branch of research that will really advance knowledge, and there is certainly no branch so universal, so wide in its bearings, as geography. What may be done with it as an adjunct to history may be seen in such recent German works as Partsch and Neumann's 'Geographie von Griechenland, mit besonderer Rücksicht auf das Alterthum,' and Ratzel's 'Anthropo-Geographie.' Here such works are impossible; there is no encouragement for research of this character; it is no one's function to pursue it. The Universities have, indeed, recognised the value of the subject to some extent by introducing it into their Local School Examinations; but, strangely, it is the only one of those subjects which is not recognised distinctively in the University professoriate.

To quote the language of the letter sent to the Vice-Chancellors of Oxford and Cambridge, dated July 3rd, 1871, "We look to the Universities, not only to rescue geography from being badly taught in the schools of England, but to raise it to an even higher standard than it has yet attained." In his report of the last examination for the Society's Medals (1884), Professor Mosely concludes,—"The more I gain experience as an examiner in physical geography, the more I am convinced of its value as a subject of general education, and the more I regret that it is not represented in British as it is in German Universities. It is almost hopeless to expect that schools will do it justice until it is recognised at the Universities, and scholarships, and other inducements are open to those proficient in it." In a previous report he referred to this country as one which has "no representative professors of any branch of geography in any one of its Universities, and in most of the schools of which the subject is practically neglected. . . . The neglect of geography at the Universities naturally leads to its neglect in most of the principal schools; there are no scholarships or fellowships to be won by it, and thus, instead of ousting from the time-worn curricula subjects far less fitting, both as means of mental training and as useful acquisitions, geography has allotted to it in the weekly routine in these schools probably only a meagre couple of hours." These statements are amply confirmed by my own experience as the Society's Inspector. It is surely a serious matter for the University authorities to consider

that they are to blame for the almost total neglect, in the great public schools of that country, to whose sons it is of such vast moment, of a branch of knowledge, recognised as of so much importance in nearly every other country.

It has been objected to the recognition of geography by the Universities that it is not a "manly" subject, but one fit only for elementary classes. In reply to this, we need only point to what the subject has become under the hands of German professors and specialists in geography; and to the "Instruction" as to the curriculum in geography, for the Kriegs-Akademie (Staff College) of Berlin, which I give in the Appendix (G). I quite recognise that in the matter of geography the idea of asking the English Universities to do the normal school work done by the geographical professors of most German Universities would never be entertained, and would be foreign to the whole genius of these institutions. But apart from such work, there is enough in the programmes of the German chairs, such chairs as those of Richthofen, Wagner, and Rein, to show what could be done with the subject even on the lines along which our own Universities work.

*The Field of Geography as a University Subject.*—There can be no doubt that for educational purposes, at least, the field of geography requires to be strictly defined; for purposes of research its limits may be left as vague as the limits of other departments of science. I have said that those University men who know best what the subject is in all its bearings, are those who most strongly advocate its recognition in the professoriate. Both historical and geological specialists admit the great importance of the subject from their own points of view; each, however, claiming geography as a branch of their own department. The pure geologist, especially, is unwilling to admit that geography has any existence apart from geology, which simply shows his ignorance of the great fields that have been worked by Continental geographers, and which would be quite beyond the function of the geologist or any other specialist, as such, to touch. Geography really begins where geology leaves off, while for the historian, whether of the political, social, or industrial development of a people, it ought to be kept constantly in view as the field and background of all his researches. One well-known geologist has objected to geography as a University subject because it is a *graphy* and not a *logy*. As I find the strongest opposition to geography as a distinct field of research comes from the side of geology, I have sought the opinion of a geologist whom all must admit as one of the greatest authorities in his subject, Dr. A. Geikie, F.R.S., Director-General of the Geological Survey. Mr. Geikie has himself carried his geology into the geographical field with most interesting results. I do not refer merely to his well-known 'Physical Geography,' but to such works as that published many years ago on 'The Scenery of Scotland,'

and to his recent lectures at the Royal Institution on the general subject of scenery in its geological aspects. The following is the communication which Mr. Geikie has been good enough to send me:—

"In reply to your question I gladly state my opinion regarding the position of geography as a University subject.

"Geography, looked at from the scientific side, is not itself a science, but rather a department in which various sciences are co-ordinated in such a way as to present a vivid picture of the different regions of the world, and a clear statement of the causes that determine the resemblances and contrasts of these regions. The forms of the land and their origin, the climates of the globe, the distribution of plants and animals, and the causes that have regulated it, the influence of the variations of climate, soil, and topography upon the history of man, the reaction of man upon nature—these, and a thousand other connected problems, form the subject of the highest kind of geography. Such a theme, invested with so much deep human interest, possesses a peculiar value in education. Indeed, I know of no other that lends itself so effectively to the teacher who wishes to inspire his pupils with some appreciation of the nature and value of scientific observation and reasoning. The illustrations are familiar, and the problems suggested by them are often of the most fascinating kind.

"I have long been of opinion that geography in this sense of the term ought to form an essential part of education. It ought as a matter of course to occupy a distinct and important place in the curriculum of every High School. Carried into its higher departments, it should certainly be recognised as also a University subject. In its true sense geography is a branch of geology; and where there is already a Professor of Geology, I would not, for the present at least, advocate the establishment of a separate Chair of Geography. From my own experience in teaching, I can testify that in a geological course, a Professor of Geology can with much advantage find a place for the exposition of this higher geography. But geology is every day increasing its scope, which already is too vast for the physical powers of even the most indefatigable teacher. Geography at a University might fittingly form the subject of a special Lectureship; the lectures and general teaching being arranged in concert with the Professor of Geology. If the salary and position were such as to secure the services of competent men, the post might be filled by a succession of enthusiastic young lecturers. It would be no disadvantage either to the subject itself, or to the University, even if the post were only held temporarily for a given number of years. Every side of this many-sided subject might thus in turn be presented—the more strictly geological, the climatological, the biological, the ethnological, the historical.

"I sincerely hope that before long a scientific geography will be recognised as one of the most useful parts of the science curriculum of our Universities."

Geographers would no doubt be content at present to obtain even the recognition at the Universities which Mr. Geikie would advocate, hoping that in time a school of geographers would grow up capable of cultivating the many-sided subject as effectively as is now being done in certain of the German Universities. It is a fact, as I point out in speaking of German Universities, that all the best geographers have approached the subject from the side of science; not necessarily from that of geology, from which such men as Richthofen and Rein have approached it. Wagner's starting-point was mathematics and physics,

while that of Bates and Wallace was biology. While it is history in its widest sense that profits most by geographical research, the historian pure and simple has seldom done much effective work in geography, has seldom been able, indeed, to use it effectively for his own purpose. If such a geologist could be found as is indicated in Mr. Geikie's letter, one who, making geology his starting-point, was prepared to make incursions into all the other fields of research, and co-ordinate the results from the geographical standpoint, probably no better beginning could be made. If, however, he confined himself solely to what is usually known as physical geography, the result would be as unsatisfactory as in the English public schools. One of the most comprehensive definitions of geography I have seen is that contained in the official 'Instructionen für den Unterricht an der Gymnasium in Österreich,' a large volume, in which forty pages are devoted to directions for geographical instruction. "Geography," we are told, "studies the earth as a whole and the things on its surface as such, in their arrangement on that surface, and in their relations to it and to each other." This, it seems to me, shows that to anchor one's self to any one department of science would make anything like thorough progress in geography impossible. It is rightly enough contended, as is done by Mr. Coutts Trotter and Mr. G. H. Darwin (Appendix F**), that many of the data of geography are found attached to various sciences; but as a matter of fact unless co-ordinated around the geographical standpoint, their geographical bearings are entirely lost sight of. It might as well be contended that as nearly all the data of meteorology are furnished by chemistry and physics, there is no need for any special department of research to deal with the atmosphere and atmospheric phenomena. What would geology itself be without the aid it derives from physics, chemistry, astronomy, zoology, and botany? How the definition I have given above may be worked out is well illustrated in the extracts (Appendix M) from Professor Richthofen's 'Address on the Field and Methods of Geography,' and in the programmes of several German professors of the subject to be found in the Appendix, as also in the paper by Mr. F. Galton in the Cambridge Essays (1855). At the same time it must be admitted, that some German geographers seem to claim far too much for their subject, and some clear-headed Englishman is wanted to do for geography what Lyell did for geology. This subject is referred to further in connection with the German conception of Geography, p. 470. Just before going to press I have received an interesting communication from Dr. James Bryce, M.P., on the subject of this section, which will be found in Appendix Z.

*Geography in the Public Services.*—With regard to the comparative position of geography in the examinations for our public services, I find that it has a place in most of them. For the lower departments of

these services, and for the preliminary examinations of some of the higher departments, it is compulsory, the papers set being of the most elementary character, even for cadetships in the Royal Navy. For the "Further Examinations" for the Military Service, papers on geography of a more advanced kind are set as optional subjects. For admission to Sandhurst, for example, physical geography and geology, as one subject, is on a par with Greek, higher mathematics, English history, and experimental science, the marks attainable for each being 2,000, as compared with 3,000 for Latin, mathematics, French, and German. A comparatively small percentage of candidates seem to take this subject, as small as that for the experimental sciences, and smaller than that for German. I give a specimen of the Further Examination paper, set for entrance into Sandhurst, in the Appendix (H). In any European country of importance, except England, the papers set would be considered extremely elementary, and yet, except in the case of the very few schools which have a special army class, it is almost certain that the ordinary course of instruction in any of our great public schools would not qualify a candidate to pass the examinations; the result is that the subject is left to crammers.

I find that in none of the schools for the education of our military and naval officers does geography find a place of any importance, exhibiting a marked contrast in this respect to most of the corresponding institutes on the Continent. With reference to H.M. ship *Britannia*, for instance, I have the following statement:—

"It is felt that, if anything can be left to be acquired in the future, geography can be so left to naval officers; their training and career naturally leading them to acquire geographical knowledge in the best possible way by visiting foreign parts. In the early part of the course here, the cadets read and are instructed in a small Manual of Physical Geography written by one of the naval instructors. They have lectures on this twice a week, and are examined in it at the end of their first term. I enclose a copy of an Examination Paper that you may see the simple character of the teaching. (See Appendix I.) There is an English class of an hour once a week, and as historical subjects are read, the teacher naturally refers to geographical knowledge, but beyond these two forms the teaching of geography may be said to be relegated to the experience of after-life."

In the Royal Naval College, Greenwich, the only geography taught is such physical geography as may be incidental to the subject of Winds and Currents.

From the Military History Notes sent me by Major Pratt of the Royal Military Academy, it would seem that in connection with such history, a good deal of special physical geography is introduced. Major Pratt writes as follows:—

"At the commencement of my lectures on any campaign, I usually describe the general aspect of the country, chiefly with reference to the high and low lands, the

watersheds, rivers, roads, main towns, &c. The geography of a theatre of war has to be studied to a certain extent in order to understand military operations, but it is only possible to touch slightly on it in the course of military history at the Academy on account of the difficulty in supplying cadets with suitable maps. Maps which show accurately the physical features which are of importance in military operations are far too expensive to be issued individually to cadets, and there are no means available of a large class having access to a few copies. I strive to give a general knowledge of the features of the country or particular battle-field by referring to the few large skeleton diagrams I possess. The time allotted to the study of military history at the Academy is besides but little, and I am therefore only able to touch slightly on the geographical aspect of the study."

The place given to the subject in the Kriegs-Akademie of Berlin, and the sense of the importance to officers of a thorough knowledge of geography in its widest sense, will be seen from the "Instruction" in the Appendix (G) already referred to.

In the French Superior School of War, corresponding to our Staff College, as well as at St. Cyr, geography is the most important subject of education, as will be seen later on. In our Staff College, frontier geography and military surveying are most effectively taught. But there is no guarantee that our military and naval officers enter on their career with more than the most elementary knowledge of general geography.

Sir Charles (then Major) Wilson, R.E., drew attention in his Address, as President of Section E at the Dublin Meeting of the British Association, to the vast importance of a knowledge of geography to military men. "Sufficient importance," he stated, "is not attached to a knowledge of geography in military sciences." He then goes on to point out how greatly a knowledge of the physical geography of any theatre of war may influence a campaign. "Queen Elizabeth's minister was right when he said that 'knowledge is power;' and a knowledge of the physical features of a country, combined with a just appreciation of their influence on military operations, is a very great power in war. A commander entering upon a campaign without such knowledge may be likened to a man groping in the dark; with it he may act with a boldness and decision that will often ensure success. It was this class of knowledge, possessed in the highest degree by all great commanders, that enabled Jomini to foretell the collision of the French and Prussian armies at Jena in 1807, and in later years enabled a Prussian officer, when told that MacMahon had marched northwards from Chalons, to point unerringly to Sedan as the place where the decisive battle would be fought. Chief Justice Daly, in his address to the American Geographical Society, draws attention to the Franco-German War as 'a war fought as much by maps as by weapons,' and attributes the result to 'skilful military movements, performed by an army thoroughly acquainted with all the geographical features of the country over which

it was moved;' and, he adds, 'It teaches us that if the fate of a nation may depend upon a battle, a battle may depend on a knowledge of geography.' As, then, all military operations must be based on a knowledge of the country in which they are to be carried on, it should never be forgotten that every country contiguous to our own (and the ocean brings us into contact with almost every country in the world) may be a possible theatre of war."

*The Science and Art Department.*—It should be stated that the South Kensington Science and Art Department examine in Physiography in three stages,—elementary, advanced, and honours,—and this has, no doubt, done much to advance among the classes reached by these examinations really scientific, physical, and astronomical geography. In 1883, the total number of candidates for the Science and Art Examination was 54,093, and of these 5575 took physiography as one subject. The general results of the examination for that year will be seen from the extract from the Report of the examiners, Professor Judd and Mr. Norman Lockyer, in the Appendix (I*).

*Conclusion as to Great Britain.*—Except, then, in our elementary schools, in the high schools for girls and in isolated middle-class schools, Professor Moseley's statement still holds good, geography in this country is almost entirely neglected as a subject of education. An educational authority, in writing to me, puts the situation very tersely, thus:—

"(1) In Universities it is nil. (2) In Public Schools very nearly nil, as the Society's examinations for their medals have proved. And when it is attempted, it is given to the most incompetent master, and he has a wretched set of maps. (3) It is required for the Public Services, and taught, I do not know how, by crammers. (4) The only places where geography is systematically taught in England, are the Training Colleges, male and female, and the National Board Schools; with now, and of the last few years, some few good High and Middle-Class Schools."

Even with the time now allotted to it in our higher grade schools, much more could be made of the subject if the teachers themselves had any real knowledge of it, had some training in the best methods of teaching it, and worked on a common programme intelligently constructed so as to cover the whole field systematically, and had at their disposal such text-books, maps, and other apparatus as are almost universal on the Continent.

## THE CONTINENT.

*General Position.*—Turning to the Continent, a different condition of things presents itself,—at least in those countries, concerning

which I have obtained information — Belgium, Holland, Germany, Austria, Italy, Switzerland, France, Sweden, and Norway, and even Spain. In all these countries education of all grades is more or less under the direction of the State. For the different classes of schools, the State prescribes the character of the education to be given, the subjects to be taught, and the general programme for each subject. In all these official regulations geography has a distinct place. The field to be covered is prescribed, the aim being that the pupil shall have a complete course of geography, the field varying in extent with the grade of the school. In the higher grade schools, Gymnasia and Realschulen in Germany, Lycées in France, Athenées in Belgium, schools which may be held to correspond with our great public schools, geography must be taught for, on an average, two hours a week in the lower, and from one to two in the higher school, up to at least the second highest class. As the curriculum in these schools lasts from six to nine years, and as the programme is carefully devised so as to include all sections of Geography, general and special, mathematical, physical and political, and to embrace all the parts of the earth, there is some security that a pupil who works fairly, will come out of the school with a knowledge of geography at least equal to that set in the Further Examination for Candidates for Sandhurst, if he is not indeed up to the standard demanded for the Society's medals. What that standard is in many countries may be seen in the programmes given in the Appendix, and referred to after. Of course in some of these schools, especially of the Gymnasium class, languages still hold the most prominent place, and next to them mathematics; but not even the most zealous advocate of geography would seek to place the subject in a position of equality as to time with such subjects in the higher schools for general education. It has the same treatment as history, as natural science, as physics and chemistry; indeed, these latter are taught only in the highest classes in Germany.

There is, then, the first striking fact with regard to the subject on the Continent that it is officially recognised by the States as of equal value with the subjects referred to, and is prescribed as compulsory in every class of school, and throughout nearly the whole curriculum of the highest schools. Not physical geography alone is thus dealt with; there is no separation of the subject into its parts as in England; the subject is treated as one inseparable whole, all the parts of which dovetail into each other.

## GERMANY.

*General Position.*—Germany may be taken as the model which all the other Continental countries are following, as far as their special circumstances will permit. German geographers tell us that geographical education is by no means what it should be in

Germany, and the worst that can be said of it will be found in the series of instructive papers by Professor H. Wagner in the 'Geographisches Jahrbuch.' Of the twenty-one German Universities, he tells us, there are still nine without classes of geography, while in the higher schools the teachers of geography are still far from being instructed and tested up to the standard of other teachers; even in Prussia geography is still sometimes yoked with history. One lesson a week in geography in Tertia is altogether too little. This simply shows the high standard of German geographers—a standard which, so far as education is concerned, we are not within sight of. Nearly all of the existing twelve professorships of geography in Germany have been founded during the last twelve years. Already they have had the most marked influence, not only on the improvement of geographical education in schools, but in opening up a field of research previously untouched by any department of science.

As might be expected, there are differences in the different provinces of Germany. In some cases geography and history are prescribed for on one basis of time, while in others they are quite separate, and each allotted its separate time. The tendency everywhere is to separate the two subjects, and in a circular from the Minister of Public Instruction, dated March 31, 1882, directors of the higher schools are enjoined to avoid, as far as possible, leaving geography and history to the hands of the same teacher. Naturally German geographers would insist on having geography taught by masters exclusively devoted to the subject; but this is not necessary. So long as the master has had a special training for the purpose there is no reason why he should not combine geography either with a science or a language. In some schools in Germany, and more so, I believe in France, Holland, and Belgium, teachers or "professors" are found who devote themselves entirely to geography. They may teach the whole of the geography in one school, or be attached to more than one institution.

Dr. Lehmann, of Halle (now Professor of Geography at Münster), is regarded in Germany as one of the first authorities on geographical education, and his standard is naturally very high. He told me he was not satisfied with the position of the subject in Germany. While well taught in some schools, on the whole it is unsystematic and unintelligent. He is of opinion that in Germany its importance as a subject of education is not yet sufficiently recognised. Many of the teachers are comparatively untrained, and have no special knowledge of the subject. The establishment of Chairs in the Universities, he admits, has helped greatly to improve matters, but at present there is much to be desired both in the teachers, in the methods employed, and in the *Lehrmittel*. In elementary schools and Bürgerschulen, the subject is more methodically and intelligently taught than in higher schools, because the teachers have been properly trained at normal schools. There is still much needed to be done to improve maps.

R. Kiepert's maps of European countries are the best we have, but even these could be improved upon. They are on too small a scale; they have too many names and too many rivers for school maps. The best plan, Dr. Lehmann thinks, would be to get the maps of each country published in the country itself; and I may say that in more than one superior school in Germany (and in all the Universities I visited), I found this plan carried out to a greater or less extent.

This is Dr. Lehmann's opinion; but then he has nothing to compare Germany with but his own ideal. To an Englishman, familiar with the practice, the methods and the apparatus of the subject in English schools, Germany must seem very far ahead. There can be no doubt that after the Universities have been a few more years at work, the practice in Germany will be still further improved.

The ideal aimed at, and, indeed, being rapidly carried out, is to have one continuous course of geographical instruction from the youngest school-year up to the University. The elementary stage is met with in practically all primary schools in Germany, and in the preparatory classes of the higher schools; and this stage is rapidly finding its way into the corresponding schools of most other Continental countries.

*Heimatskunde.*—This elementary stage is what is known in Germany as *Heimatskunde*, combined with or preceded by *Anschauungslehre*, i.e., teaching by actual observation. And it is an interesting fact that Rousseau in his 'Emile' enjoins geographical instruction to start with the pupil's home. What text books exist for this stage are meant only for the teacher, the pupils obtaining their notions by actual observation or practice. One of the most noteworthy lessons of this kind I witnessed in the model school of Brussels, in the three youngest classes of the school. In the first stage, which occupies a year, the aim is to give the children a mastery of the cardinal points, the course of the sun in the heavens, and similar elementary notions. The boys are made to trace with chalk the leading points of the compass on the floor, march in various directions, give the relative positions of objects in the room, point with their finger the course of the sun in the sky in summer and winter, and so on. In the next stage, a map of the city and the surrounding district is used, and the knowledge obtained in the previous class applied to this. Then follows a globe, the pupils in the meantime acquiring a fair knowledge of the elementary geography of their province and even of their country. In a Bürgerschule in Leipzig, I was present at another lesson in *Heimatskunde*. The map was a large coloured plan of the town and neighbourhood, every pupil having a corresponding map before him. First their knowledge of the points of the compass was tested practically; the directions of the principal streets; the principal buildings and their positions with reference to squares, streets and other buildings; names of the leading streets, buildings, squares, promenades, and their relative positions. Each suburb

was treated in the same way. The boys were then sent to the map to point in reply to the teacher's questions; and they were made to put questions to each other. A boy was asked where he lived; he would give the suburb and street. He had then to tell the streets he traversed in going home; the monuments, churches, parks, &c., he passed. Next he had to point out on the map his route to and from school, naming the directions he took. Then the boys were examined on their atlases in the same way as on the large map. In all cases the boys were intensely interested. The method of *Heimatskunde* proceeds from the town or immediate neighbourhood to the district, then to the province, and so outwards to Germany, Europe, and the other parts of the world, in five classes.

In the fifth class of the same Bürgerschule, for example, I was present at a lesson on the *Heimatskunde* of Saxony. The boys have a very small text-book—'Hugo's Heimatskunde von Sachsen,' along with a good large map of the province. There was a good physical map, without names, on the wall along with a large map of Germany. A boy would read a sentence from the book, relating it might be to the nature of the surface, the rivers, the mineral products. Hereon the teacher, partly by questioning the boys as to their own knowledge, and partly by giving them information, expanded the subject considerably. Thus in relation to metals and minerals—iron, coal, lead, tin, &c.—much useful information was brought out as to their nature, uses, places where found, methods of mining, working, and so on. Specimens of various substances which had been collected by the boys themselves, were shown to the class. Boys were sent to the scuttle to bring a piece of coal, point out any iron, brass, &c., to the room. The boys were also made to elicit from the small maps before them whatever information they could be made to yield.

The information thus conveyed is of the most varied kind; not merely as to topography, but the products, industries, manufactures, historical associations, &c., of the region, while the pupils are trained to observe and think for themselves. In Germany, Switzerland, and, to some extent, in the other countries I visited, there are many special maps published for Heimatskunde, and many text-books for the use of the teachers. It is a most effective method of impressing upon the pupil a real and lasting idea of the elements of geography and cartography; and when, as in many districts, reliefs and pictures are utilised, it is evident that under good teachers the pupil will proceed to a higher stage with a very real notion of what a map is meant to represent, and prepared to begin the serious study of more advanced geography. This system is finding its way into English Board Schools, many of which are provided with large-scale Ordnance Survey maps of the school district. In many German Realschulen there is an elementary or preparatory school in which Heimatskunde finds a place. Both in the

Brussels school and the Leipzig school, there was a large stock, not only of maps (probably 100 in Leipzig), but of excellent geographical pictures, such as those found in the Exhibition, globes, telluria, mineralogical, and botanical specimens, and other aids to make the lessons as real and attractive and instructive as possible.

An essential part of *Heimatskunde*, as planned by Dr. Finger, who may be regarded as its inventor, and with whom I had an interesting interview at Frankfort, is the taking of the pupils on excursions to the districts around the school, and, if practicable during holidays, on somewhat distant tours. With their maps in their hands they identify the leading features, become personally acquainted with cities, rivers, mining districts, and minerals manufactories. This plan of making excursions, sometimes to a considerable distance, and lasting for days, is carried out in Germany and France, and even in Spain. (See Appendix Y.) At the same time, both in the school neighbourhood and elsewhere, opportunity is taken of practically illustrating the elementary facts and principles of geographical knowledge, and of making such observations and experiments in connection therewith as will be understood without difficulty. A very satisfactory account of the matter will be found in the 'Proceedings' of the Royal Geographical Society for November, 1884, p. 674, in the paper by Mr. Ravenstein read at the Montreal meeting of the British Association. One of the best expositions of the method is given in the "Instructions" for education in Austrian Gymnasia, and this will be found in the Appendix (K).

*Map-reading.*—One of the most difficult tasks to accomplish in teaching geography is to get the pupils to realise what a map means, and to read it. It is no easy matter even for adults to realise to themselves the conditions which certain markings on a flat surface indicate. I therefore find that much time is as a rule spent in German schools, in the elementary stages, in endeavouring to accomplish this desirable end,—an end kept constantly in view throughout the method of *Heimatskunde*. One of the most successful geographical teachers in Germany, Dr. Lehmann, late of the Realgymnasium in the Franksche Stiftungen of Halle, now of Münster, devotes a large part of the first three years of his course to this purpose. He constantly exercises his pupils during that time in precise map-drawing after himself on the black-board or from the Zeichen-Atlas; makes them thoroughly understand the significance of all the symbols used to represent graphical features; trains them carefully in the use of contour lines and graduated mountain shading, scales, and so on. Of course all this is possible only in a country in which school maps and atlases are executed with scientific precision, which is rarely the case in England. After his three years' training, Dr. Lehmann does not trouble his pupils more with map-drawing, unless for special purposes; the end to be attained by the practice has in his estimation been served. At his request

I selected four boys from one of his younger classes, which was having a lesson in the geography of Australasia. Two of them sat beside me and drew from memory on blank sheets a map of Australia; putting in the lines of latitude and longitude with precision, and all the features of the continent with intelligence and correctness. The other two went to the black-board, and copied to a scale at least four times the size, the map of Australia in their atlas, filling in the physical features with coloured chalk, carefully graduating the mountain shading, and otherwise showing that they had an intelligent conception of what a map is. Dr. Lehmann also makes use of small relief maps by putting them in a glass case fixed in the wall near the door in such a position that any one may examine them after the lesson. This case he uses also for other objects bearing on his lessons. He insists that the cartographical symbols be as perfectly and completely learned as the letters of the alphabet by a child learning to read. The pupils are encouraged to elicit all the information which the map is intended to convey, supplemented by the text-book and the information conveyed by the teacher. The text-book, Kirchhoff's, is used mainly as a guide, and this I found to be the case in most German schools.

While on the subject of map-reading, I may say that throughout Germany the use of sand to build up the features of a district is greatly in vogue; but after a much more precise method than I have seen in the schools in which I found the method in use in this country. In the first Realschule of Leipzig for example, the staff map of the district is used, and the pupils made to build up a same relief with careful regard to the contour lines. Another method of teaching the significance of cartographic symbols I found, in a secondary school in Zürich, in a class the pupils of which were about twelve years of age. Taking the carefully-drawn maps for the purpose in the beginning of Wettstein's fine school atlas, the pupils are made to cut out pieces of cardboard for the different levels, and so build up a relief, which enables them to realise what the symbols signify. As the contour lines are combined with carefully graduated mountain-shading, the pupils thus come to learn the significance of the customary map-symbols. Specimens of these reliefs will be found in the Exhibition. There is no doubt that the judicious use of good reliefs along with corresponding maps, is a very effective method of teaching the pupil to interpret maps. The method used at the Austrian Cadet-school, above referred to, is an admirable one. On a table is a relief of a particular region, limited enough to avoid exaggeration of altitudes; and above this are corresponding maps on various scales, and with various methods of representing altitudes.

In my opinion it is mischievous, unless for exceptional purposes, to make use of maps in schools, either wall-maps or atlases, which differ greatly in their cartographic methods from those in ordinary use.

For example, the use of black lines for mountain systems is not desirable; pupils accustomed to the exclusive use of such maps will, when they leave school, have to forget nearly all the cartography they have learned, in order to teach themselves to read the maps in common use. Such methods are rarely met with on the Continent. The aim in Germany, at least, among good school cartographers, with the approval of the best geographers, is to produce accurately and clearly-drawn maps on the basis of the most effective cartographic methods.

*Geography in the Higher German Schools.*—What is actually taught in the higher schools of Germany, the Gymnasia and Realschulen, under the name of geography, may be seen from the programme of the Realschule of the First Order, at Leipzig. This may be taken as a fairly representative German superior school; for although Saxony may be better off in the matter of geography than Prussia, that seems mainly due to the fact that in the former there are more specially trained geographical teachers than in the latter; and the separation between geography and history is more distinct. The following programme is that which was actually carried out in the school year 1882–3. In Germany the lowest class is sexta, the highest prima :—

*Sexta.*—Two hours per week. Fundamental positions of mathematical geography and the leading principles of physical geography. General view of the division of land and water on the surface of the earth. Geography of Saxony. Exercises in reading and drawing maps.

*Quinta.*—Two hours per week. Further instruction in the fundamental conceptions of geography. General description of Europe, especially of Germany. Exercises in map drawing.

*Quarta.*—Two hours per week. Revision of the leading principles of physical and mathematical geography. Extra European Continents. Map drawing.

*Tertia.*—Two hours per week. Germany, physical and political. Map drawing.

*Unter-Sekunda.*—Two hours per week. Geography of foreign European countries and their colonies.

*Ober-Sekunda.*—Two hours per week. Extra-European continents, with special reference to their physical conditions.

*Unter-Prima.*—Two hours per week. Revision of the whole field of geography. Astronomical geography; continuous observation of the apparent course of the sun by means of a gnomon. Observations of stars. True and mean solar time and stellar time; the ecliptic.

*Ober-Prima.*—Two hours per week. Revision of the whole field of geography. Astronomical geography. Proofs of the globular form of the earth, of its rotation, of its revolution round the sun, the orbits of the planets.

As this course extends over nine years; as geography has a real place in the leaving-certificate of all German schools, and is therefore obligatory; and as the field gone over and the methods in use in most German schools are the same, there is a guarantee that a pupil, even if he change his school, shall leave it with a full and sound knowledge of elementary geography in all its sections and divisions. At certain schools in England if a boy goes through the entire curriculum, he may come out with such a knowledge; in very few of the great public schools is it likely. Such a course would lead up to no examination, and would therefore be regarded as a waste of time.

The apparatus in use at this school, and which is under the care of Dr. Götze, one of the ablest and most intelligent teachers of geography in Germany, I have given a list of in the appendix. And to show that it is nothing unusual I have also given the list of geographical apparatus in use at the Wöhler Realschule of Frankfurt-on-the-Main, under Dr. Kortigarn (Appendix L).

Either at the preparatory school or elsewhere the pupils will have been rounded in Anschauungslehre and Heimatskunde before beginning the above course. I found in one or two schools that Heimatskunde was not begun till the third form at the Vorschule, formally at least; for in Germany I found much complaint among teachers as to overpressure and overcrowding of the programme in the higher schools.

The above programme is simply the official programme prescribed for geography by the Education Department, given in a little more detail; and it is essentially that of all Realschulen and Gymnasia in Germany. In the latter, which are classical schools, it is admitted that geography is apt to be snubbed in the last two years of the course; and it seemed to me that the apparatus in the Gymnasia I visited was neither so plentiful nor so good as in the Realschulen.

As to method, it strikes me that teaching generally is a much more lively and active operation on the Continent than in England. So far as geography is concerned, the teacher counts for a great deal, and the text-book is proportionately of less importance than in England. I saw very little of mere lesson-hearing on the Continent. The text-book, as I have said already, is really what its name implies. A very moderate portion is taken as the text of a lesson, or a sentence or two is read out in the class; this is expanded by the teacher from information obtained by him from works published expressly for the use of teachers. He is constantly encouraging the pupils to think for themselves, constantly endeavouring to draw out from them what they themselves know, or what they may be able to read in the maps, pictures, diagrams, ethnological pictures, reliefs, and specimens before them. Every teacher whom I saw at work had a supply of coloured chalk beside him, and made constant and effective use of the black-board, the slate maps, or slate globe. In this way it will be seen very excellent use can be made of the two hours

a week allotted to the subject for eight years or so. Of course, with the best German teachers, there is no attempt to crowd the lessons with minute details, no long lists of names or tables of statistics, populations of cities, length of rivers, heights of mountains down to the final unit. While there is certainly a fair amount of memory work, only leading features, facts, and principles are insisted on.

*Examples of Lessons in Geography.*—Perhaps a few of the notes which I took of the lessons at which I was present, may be of service in showing the general method of teaching in German schools.

At Halle I was present at a lesson on Australia in the Quarta class of the Realgymnasium, given by a candidate for the degree of *Facultas Docendi* in geography. It may be regarded as typical of the method generally followed in such schools. Bamberg's wall-map of Australasia was used. The teacher himself rapidly drew a large scale map of Australia on a sheet of paper on the wall; he made one or two mistakes in the outline of the coast, which he asked his boys to point out; several did so correctly. The pupils were questioned as to the number of continents and oceans; their comparative sizes, which were illustrated by a sheet of parallelograms. Australia was compared as to its prominent features with other continents; with Russia, Germany, England; peculiarities of coast, gulfs, bays, islands, reefs; regions around Australia; general configuration of the land; mountain systems, table-land of interior. A boy was set to draw on black-board a section across the continent from east to west, giving general heights of table-land and of coast ranges. Rivers—their sources, courses, fall, general characteristics, navigability treated. Then came the prevailing winds, and the characteristics of the regions from which they come; their effects on the climate, first, on the east coast, second, on the interior; mountains; general features of climate and results on vegetation. Leaves of Eucalyptus were shown as illustrative of the peculiar vegetation of Australia.

A life-sized picture of the head of an Australian native was shown. The boys were examined as to what they learned from the picture, and much intelligence was shown by them in reading it. Australians compared with other races, their hair, nose (illustrated by diagram on black-board), habits, dwellings, food, weapons, &c. Boomerangs and spears were exhibited.

The division of Australia among the various Colonies was next gone into; the situation and size of the chief towns as compared with Halle and Dresden, illustrated diagrammatically. Diagrams, with vari-coloured chalks, were, indeed, much used throughout. In referring to the telegraphic connections of Australia, specimens of deep-sea cable were shown, in referring to products, specimens of wool shown. The history of discovery in Australia briefly touched upon. Boys encouraged to give reasons for the leading facts of Australian geography. Lastly, they were

ordered to take out their papers and draw a map of Australia, using the large wall-map as copy; this they did rapidly and well.

Much of this information was given for the first time. The boys were evidently accustomed to the method; on being afterwards questioned, the answers given were astonishingly full and intelligent.

There was seldom any reference to books or notes; the teacher in constant activity, and pupils on the alert, and generally interested. Altogether the method is one which not only keeps alive the interest of the boys, but succeeds in conveying much solid information not otherwise obtainable, and in teaching the pupils to think and draw inferences for themselves.

In a lower class in the same school I was present while Dr. Lehmann gave a lesson also on Australia; the method followed being much the same. The boys were questioned as to the significance of the various cartographic features, the information conveyed by the various contours and shades of colour, to indicate plains, table-lands, hills, mountains, &c. The peculiar character of the fauna insisted on; absence of the large carnivora; a large picture of kangaroo and young shown.

I was also present at a lesson in the Ober-Secunda Class on Central America and the West Indies, in which the subject was gone into with a depth proportionate to the advanced stage of the class. Not merely the geographical data in the most comprehensive sense were dwelt upon, but the causes elicited for the phenomena dealt with. The text-book was Kirchhoff's, in use throughout the school, and, as usual, was used merely as a text-book. As usual also the pupils were made to interpret the map, the master giving comments and conveying further information. The influence of the meteorology of Central America on its climate and products brought out. The peculiar vegetation dwelt on; the special character of the leaves of certain plants shown to be the result of the peculiar rainfall conditions. The inhabitants at the time of the Spanish Conquest, their characteristics, civilisation, and relations to the populations; North and South American Indians in general referred to; the prevailing Indian populations over the continent at the present time, and their influence on the political and social conditions. Central America and Mexico, with their proportionately large Indian population contrasted with the United States, in which the Indian element is comparatively small. Difference between the civilisation and political condition of an agricultural and a hunting people dwelt upon. The West Indies were then treated of; the different groups and their physical characters; coral and volcanic islands contrasted with continental islands. Formation of coral reefs explained and illustrated. Besides a physical map and small relief map, Mohn's Isobars for July were shown.

I might give similar notes for many other schools. In Leipzig I was present at a lesson on the geography of Italy in the First Realschule, by Dr. Götze, in which the method and the fulness of the teaching were the

same. The physical geography had been completed, and the political geography was about to be entered on. The physical and the political maps were both hung up, and the leading points in the physical geography gone over on the political map, so as to make the two sections dovetail. The mountain systems, their connection with neighbouring systems, their ramifications and offshoots, their special characteristics and directions, with the consequent results in the country on each side of their course. The leading heights were well in the memory of the pupils, and constant reference was made to well-known heights in Saxony and other parts of Germany. The rivers were taken up, and their connection with the mountains. Why are the rivers from the Alps much larger than those from the Apennines? Why has the Po more tributaries on the north than on the south? The tributaries on both sides had to be named from the source. The rivers of Central Italy were treated in the same way; their commercial value, and occasionally historical associations dwelt upon. Italy, I was told, is treated of in rather more detail than some other European countries, on account of its analogies with Germany—analogies which were brought out in some detail.

For the purpose of map reading, I may say that the pupils of this school are made to build up reliefs on the basis of the staff-map of the district around Leipzig. Some of them which I saw were extremely creditable.

In the First Gymnasium of Leipzig I was present at a lesson in Unter-Secunda, in physical geography, by Dr. Traumüller, in which the text-book used was Jachmann's 'Experimental Physik,' because the particular part of the subject is more fully and scientifically treated there than in the ordinary text-book. The special subject was meteorology, isobars, the action of the sun, maxima, minima, &c. Dr. Traumüller teaches his boys mostly from maps, and by his own lectures. Here, as in other Gymnasia and Realschulen which I visited, I found that continual reference was made to geography, not only in history, but in other subjects. For example, in the case of the Wöhlerschule of Frankfurt, Dr. Kortigarn informed me, that in teaching chemistry, physics, botany, and geology, the geographical bearings of the subjects are constantly pointed out. Thus, of the distribution of plants and animals, climatology, astronomical geography, historical geography, much knowledge is acquired.

While in Berlin essentially the same method is followed as in the schools of Saxony, I must say that in more than one of the schools which I visited, the teachers did not seem particularly well up to their business, and the maps were, in not a few cases, old and poor. This I was told was due to the fact of the very small allowance made by the municipality for apparatus. In an elementary school visited by me, while the Congo Conference was sitting, a very poor small map of Africa was used for the lesson, which must have been thirty years old. Still, here, as in other parts of Germany, geography has its due place in the

programme of the schools, and in two of the higher schools which I visited, at least, the teaching was nearly as good, and the method much the same as in Leipzig, Frankfurt, Halle, and Göttingen.

*Conclusions as to Higher Schools.*—In deciding the status of the pupil, the value of his geography is estimated just as that of other subjects, in this as in other German schools. The pupil's permanent place is decided by his position,—by the certificate which he receives in passing from Upper Secunda to Prima, and this certificate is included in his Leaving Certificate. In this particular, geography is exactly in the same position as Latin and Greek prose.

The general conclusion I came to was, that in the average German Realschule and Gymnasium, the pupils leave school with a sound working knowledge of geography. The teaching in English, for example, is generally so good that the average boy can both write and speak it intelligibly after his school course; and from what I observed geography is quite as really and thoroughly taught. I should say, for example, that the average boy from the Realschulen and Gymnasia which I visited in Frankfurt, Leipzig, Halle, Göttingen, Berlin, and other places, would be able, without special preparation, to answer a considerable percentage of the questions in the Royal Geographical Society's medal examinations.

In short, while the situation is not what German geographers would wish it, it is evident that there is a striking contrast between German and English schools in the treatment of geography. It is a serious subject of education, legislated for by the Government, and taught to a large extent by trained teachers for two hours a week in schools of all grades, with a wealth of apparatus not to be met with in this country. There is a journal, the 'Zeitschrift für Schulgeographie,' entirely devoted to the subject; frequent papers on improved methods and apparatus appear in other geographical journals; at national and international geographical congresses a section is devoted to it; it pays publishers and manufacturers of apparatus to devise constant additions to their stock, constant improvements in maps, reliefs, pictures, atlases, text-books. For such enterprise in this country, there is little or no encouragement except in the Board Schools.

*The German Universities.*—Turning to the position of the subject in German Universities, the fact is, that until about twelve years ago, almost the only Chair of Geography was that of Berlin, originally held by Ritter. Now there are twelve professorships of geography, and a new one has been established at Münster, in Westphalia, this year, while it is intended to establish a professorship of physiography at Berlin.

Professors of geography are in all respects on a footing of perfect equality with other professors, and may aspire to the same honorary

offices, such as dean and rector. Their official salaries are essentially the same, generally about £400 per annum, with additions in proportion to the number of students.

It is not compulsory on any class of students to take up geography, but for certain purposes students require to pass an examination in geography, and as a matter of fact, we find the regular lectures on this subject attended by numbers varying from twenty to eighty. These regular lectures may be three or four a week, with others that are open to the general public. For students making a special study of the subject, and who wish to qualify themselves for teachers, there are additional classes, or Übungen, generally in the evening, twice a week.

*Geography in the Degree of Ph.D.*—"As regards the examination for the degree of Doctor of Philosophy," Professor H. Wagner writes as to Göttingen, "geography has the same position and value as all the other subjects in the philosophical branch,—languages, history, archæology, mathematics, physics, chemistry, geology, zoology, botany, &c. If geography is the principal subject in which the candidate wishes to obtain his doctorate, he is obliged to write a scientific dissertation, which is printed, and which must exhibit the progress of the science. A compilation alone or a reproduction is not accepted for a dissertation. There is also a *vivâ voce* examination. If geography is only the second subject which the candidate chooses, there is only an oral examination. This examination is quite different from that for the *Facultas Docendi*; it is much more intensive than extensive. My method is to select two or three branches of geography and to find whether the candidate has studied the subjects thoroughly and scientifically. He is obliged to show that throughout he knows not only well-ascertained facts, but also the present position of the sciences which underlie the different topics. My object is to ascertain whether the candidate has a scientific insight into the different currents of our science."

In some Universities, the professor of history is the examiner in geography, with the result that the latter is ignored. Professor Rein found this to be the case when he came to Bonn, but insisted that he should be the sole examiner in geography, with the result that the examination is now a real one. At Göttingen, under Professor H. Wagner, as will be seen above, the geographical part of the Ph.D. examination involves quite as thorough a study as that in physics or history. In the examinations where this is the case, the attendance at the class of geography is numerous.

*The Facultas Docendi in Geography.*—There is a special degree, *Facultas Docendi*, in geography, which is passed by those intending to qualify themselves to teach the subject. The following statement sent to me by Professor H. Wagner will give some idea of the attainments

required to obtain such a degree:—"The examination for the right or faculty of teaching geography in our Gymnasia and Realschulen, consists of two degrees or stages. (*a*) That qualifying for teaching it in the lower classes. Candidates must show a good knowledge of the facts and laws of physical geography, including the elements of astronomical geography, of the orography and hydrography of the earth's surface, a certain number of geographical numerical data,—heights, depths, latitudes, and longitudes, mean temperatures, rainfall, areas, population, density, &c. They must know the various projections used in school maps; must be familiar with the political geography of foreign countries; and the leading facts in the history of discovery. (*b*) The faculty qualifying for teaching the subject in the higher classes. This examination is more extensive in respect of the various phenomena and their laws, and the candidate must show a more thorough knowledge of the history of geography and of geographical literature."

The course for the full *Facultas Docendi* generally extends over two years, and in most of the Universities, consists of a systematic series of lectures on the facts and principles of geography in its most comprehensive sense, and as a rule of considerable profundity in each department. These are illustrated by the best attainable maps, published in Germany and abroad, geographical pictures, ethnological pictures and casts, and objects of ethnological interest, geological specimens, reliefs of various kinds, diagrams, &c. At the Übungun, or exercises for special students, they are trained often in the best methods of teaching the subject. Some professors aim at training at least a few of their students to undertake geographical research. This is especially the case, I find, with Professors Rein and Richthofen.

*Professor Rein's Course.*—Professor Rein, for example, gives his students geographical subjects and problems to work out, with a view to their *Facultas Docendi*. One student I found was working out the present and past distribution of Viticulture in Germany, constructing maps to illustrate his research. This involved a minute research into the present and past physical geography as well as history of Germany, such points being brought out as that in former times, when commonwealths were isolated, communications difficult, wars frequent, and trade-routes few, the monasteries grew their own vines for communion wine, and consequently the culture of the vine extended much further north than at present. Such a research is surely an admirable discipline. Another student was working out the routes that in past and present times led to India; another the origin and history of the salt-deposits of Prussia. Other subjects for such researches referred to by Professor Rein were the effects of the Gulf Stream; the inferences to be drawn from Nordenskjöld's observations at the mouth of the Obi, as to the difference between salt and comparatively fresh water. A student who had been

working at the geography of Finland, in an exhaustive manner, had gone to that country to continue his researches on the spot. Here are a few of the questions put to students for the *Facultas Docendi* :—

What is the difference between the culture of Chinese Asia and Mongolian Asia?

What were the physical difficulties met with by Alexander the Great in his march S.E. after the Conquest of Persia?

What do you understand by the term Thuringian? Give division of the Rhenish Mountains?

At the evening exercises of Professor Rein (and I found much the same method to prevail at other Universities) each student chooses a theme and works it out. Each has his atlas before him, and to each half an hour is given to speak on his theme, which is then discussed and criticised. Thus Sir Rawson Rawson's paper on the Partition of Africa had been taken up shortly before my visit, and all allusions, historical, ethnological, physical, geographical, thoroughly gone into and cleared up. In this manner the leading topics of the day, on which geography can show light, are taken up.

I give here a note from Professor Rein on the subject of his lectures on geography given partly at Marburg and partly at Bonn.

"Subjects of Professor Rein's lectureson geography :—General orography ; climatology ; oceanography ; geography of Germany, of the Mediterranean countries, of the rest of Europe, of Asia, of America, of Australia, of Africa ; history of English explorations and of the English colonial empire ; Arctic explorations ; on the development and downfall of Portuguese colonies ; the Dutch and the English in the Indian waters ; on the history and geographical distribution of the known commercial plants ; the natural history of Japan ; the chief industries of Japan ; the great discoveries in geography ; the formation of islands and character of island life ; results of deep-sea researches ; cartography.

"On the latter subject," Professor Rein adds, "I have lectured every third or fourth semester. The lecture was always followed by practical work, when the students had to apply the theory to some special case ; for instance, after having shown Mercator's projection theoretically, my pupils would have to draw a map on a given scale, say of the German Ocean, or they would draw a map of Africa for instance, to exemplify and apply Flamsteed's projection. I was generally satisfied when they had drawn the lines for longitude and latitude, and some general outlines, in order to gain time. Such kind of work always attracted great interest and gave much satisfaction, for it established a greater insight into the ways and means by which maps are made, and fixed many an important point for ever in their minds."

I need scarcely say that the principles and practice of cartography form an important part of the exercises in connection with all the best geographical classes in Germany. Both at Bonn and Göttingen, I was shown beautiful specimens of map-construction ; and at the latter University especially, cartographic work bulks very largely. One method of Professor Rein is to make his students draw a map of a region, say of lands bordering on the North Sea, on as large a scale as the sheet will permit, and then to calculate the scale.

A great impetus has been given to the subject at Bonn by the attitude of Clausius, the eminent physicist. In the case of a student who was a candidate for the Science Certificate in teaching, and who passed in the first class in all subjects except mathematics, and particularly well in geography, Clausius stated that his position in geography would make up for his deficiency in mathematics, and so moved that the student should be granted a first-class certificate.

Both at Bonn and Göttingen, the professors of geography have large and well-appointed class-rooms, with large separate rooms for their stores of maps and apparatus, which is of the most varied and abundant character. At Leipzig and Berlin, the accommodation, owing to local circumstances, was not quite so good, but other professors were in similar case. The maps of these university classes are, as a rule, of a much more advanced character than those for schools. All the best foreign maps will be found, including the staff maps of the various countries. The professors themselves with the help of their students construct many special maps; and Professor Wagner has issued a series of outline maps of the world and its divisions, which are of the greatest utility in constructing maps to illustrate any special point in geography. Professor Rein had a very fine collection of photographs and other illustrations from all parts of the world, not to mention diagrams in connection with such subjects as the distribution of forests, the relative size of continents and oceans.

*Professor Wagner's Course.*—Professor Wagner's class, as I have indicated, is, to a considerable extent, a school of cartography; but partly by this method and partly by the ordinary system of lectures he goes over the whole field of geography in about two years. He has thirty-eight special students of cartography; four years ago there were only thirteen. He has generally one or two men who study geography for the express purpose of qualifying themselves, to become practical geographers and explorers; one such he mentioned to me who had recently gone out to Venezuela and other regions in South America for scientific exploration.

Professor Wagner has himself examined more than two hundred students for the *Facultas Docendi*, and if qualified men go out in similar proportions from the other Universities, it is evident that their influence in raising the standard of geographical teaching in schools must be very great.

The following is Professor Wagner's programme as forwarded to me by himself:—

"My full curriculum extends only about five semesters, and is, of course, not frequented by all the students during all the semesters, who study geography. But my purpose is to give every one a selection of different sections.

I. Semester.

1. General Physical Geography, Part I.—Form and dimensions; density, &c., of the earth. The movements of the earth. The surface—morphology of the dry surface. Oceanography.
2. Cartographical exercises for beginners. Theory and practice of the projections of maps. Elements of cartography.
3. A public lecture once a week, on any interesting subject, for students of every kind, e.g. on England and her Colonies; the modern history of African discovery; the development of the commerce of the world for fifty years, &c.

II. Semester.

1. General Physical Geography. Part II. Climatology. Distribution of plants and animals.
2. Special geography of the Alps.
3. Geographical exercises. Every pupil studies one or more geographical question for himself under my direction, to learn the use of instruments or to become familiar with geographical literature.

III. Semester.

1. Chorography of Europe, a physical description of Europe with respect to climate and vegetation, and a selection of historical and statistical facts, but *no* systematical political geography.
2. Geographical discussions. Readings and discussions of some ancient or modern geographical authors—Ptolemy, Marco Polo, Humboldt (Central Asia), &c. Sometimes lectures are given by the students.
3. A public lecture once a week, but not every winter.

IV. Semester.

1. Chorography of Germany (Central Europe) (*see* III.).
2. The methods (theory and practice) of teaching geography in middle schools and the apparatus for it. Specially for future teachers of geography, who are the majority of my pupils.
3. Geographical exercises for the more advanced students.

V. Semester.

(*a.*) Geography of America;
(*b.*) or of Asia.
Both with special respect to the history of discovery.
(*c.*) General ethnography.
I *select* the subject which may have the most interest for those present, and give, e.g. a lecture in ethnography in a semester in which lectures on anthropology are not given by our professors of that subject.
The majority of my people are, as you know, not geographers alone; they will have to teach afterwards, together with geography, either
(*a.*) Classics.
or (*b.*) Modern languages;
or (*c.*) History;
or (*d.*) Natural history or mathematics."

Professor Wagner aims at elevating geography in its scientific position and making it a real university discipline. He doubts whether, as a school subject, it can here be made a real discipline, without doing injustice to other subjects. At school he thinks the ground-work of general education should be laid; at the University geography can be made a special subject, a real discipline. His notion of the field

which geography should cover is somewhat similar to that of Professor von Richthofen and Professor Rein; and is indeed that which prevails generally in Germany among geographers, some of whom would, however, embrace too much of special subjects.

*The German Conception of the Field of Geography.*—It should not be lost sight of that the surface of the earth including all that is thereon, is the one subject of geographical study. This involves a study not only of the configuration of that surface, but of all those influences which shape and modify it, especially when regarded as man's habitation, and the theatre of his development. Some geographers would make man himself the centre of geographical research, and geography a study of the earth's surface, as acting on, and acted upon, by the most important factor to be found on that surface. In any view of it, it is evident that there is no one science, and no collection of sciences, when they keep strictly to their own spheres, that are called upon to work out the problems with which geography has to deal, and with which, for many years, it has been made to deal, under the hands of German geographical students. Only from the geographical standpoint could such problems be worked out as those to be found in the works of Ritter and Peschel, and to a considerable extent in those of Humboldt. But these masters have had many followers, and a long list of recent works might be given, that are possible only in a country in which special geographical research is encouraged as it is in Germany Some of these I have already referred to; and the number of high-class geographical journals in Germany is well known.

In the Appendix (M), I have given the conclusions of Professor von Richthofen's introductory address when entering on his Leipzig chair in October, 1883, and in which he surveyed the Field and Methods of Geography, and also a few extracts from Professor Wagner's paper on the Present Standpoint of Geography. Perhaps Professor Richthofen claims too much for the science, and it may be admitted that its bounds have need of more precise definition; though the same could be said of almost any department of research at the present day. The most ambitious German geographer now living, however, claims no more for geography than Kant did more than a century ago; he, and not Ritter, might well be regarded as the father of modern geographical research. Both the advocates and the opponents of geography as a distinct field of manly study would do well to read his writings on physical geography—'Immanuel Kant's Schriften zur Physischen Geographie,' edited by F. W. Schubert, Leipzig, 1839. While everyone must acknowledge the vast service which Ritter did to geography, it is held by some, without much justification, that he also to some extent retarded its progress by insisting too emphatically on its intimate connection with history. Both in Germany and France, it

was, until recently, almost invariably associated with history in schools and universities, with the result that history became everything, and geography disappeared. I was present in Leipzig at a very interesting discussion between Professor von Richthofen and two of the most eminent living German geologists. The latter were inclined, as some English geologists are, to maintain that geology leaves no room for any special physical geography. But Richthofen, himself a geologist, strongly contested this, and in the end convinced the geologists that their own science leaves whole fields of physical geography untouched. The function of geology is to study the rocks *in sitû*, their dynamics, chemistry, palæontology, &c. Thus, in the case of volcanoes, the geologist investigates the forces at work, dynamical and chemical, and their active results; while the effects of volcanic action on the surface, the terrestrial and meteorological forces at work to modify volcanic products, belong to geography. Ritter himself, in Richthofen's opinion, was too much of a theoretical, ideal, metaphysical geographer, and had too little knowledge of physical science to create an enduring and useful field for geography, contrasting markedly in this respect with Peschel. Had Humboldt been in Ritter's place, with all his knowledge of physical and natural science, he would no doubt have succeeded in creating a school of scientific geography, such as is now being formed by the efforts of German professors. All modern geographers of reputation, Richthofen points out, have approached the subject from the side of science,—Richthofen himself and Rein, Murchison and Geikie from geology, Wagner from mathematics and physics, Wallace and Bates from biology. At the same time the vast services of Ritter cannot be overlooked; it would be disastrous to the utility of geography to ignore its intimate connection with history, a connection which Kant himself insisted on as strongly as Ritter.

*Professor Richthofen's Course.*—At the time when I attended Richthofen's lectures in Leipzig, he had about fifty students. He was then dealing with the comparative geography of the continents, a subject which would probably last a semester. Richthofen aims at training his students to be not merely teachers in geography; he is desirous of creating a school of geographical specialists. At present he has no regular course. Richthofen is the successor of Peschel, and when he entered on his work in 1883, he began by giving one or two semesters to Allgemeine Erdkunde, and then entering on a minute study of some special region of the earth, as for example, Eastern Asia. At present, as I have said, his lectures consist of a comparative study of the features of the continents. The general descriptive part of this, he will afterwards include in his Allgemeine Erdkunde. With this general knowledge he will expect his students in future to be acquainted, and will devote only a small portion of time to it, probably

only a part of a semester. While Richthofen examines for the *Facultas Docendi*, there is a *Privat Docent* in Geography, Dr. Hahn, the able author of 'Inselstudien,' whose knowledge of Geographical data is probably unsurpassed. With him the students can take the ordinary subjects. Richthofen's idea is that a student of geography should not only master the general subject. He believes that in geography, as in every other department of science, the student can only qualify himself for original research, and for teaching the subject fundamentally, by making a profound study of some one department, or some one region. It is so in Physics, Chemistry, Biology, Geology: and so it is in Geography. Thus he will have no regular course of lectures. He will go on taking up special aspects of geography, and treating them minutely in a series of lectures, each extending probably over a series of semesters.

Like other German professors, Richthofen has his special class, his Übungen, held in his apparatus-room once a week for three hours; and here he carries out his special aims also. Each student selects his subject, which he works out minutely, and gives the results at the meeting, which are then criticised by students and professor. At the meeting at which I "assisted" there were about a dozen students present. The two subjects for the evening were the geography of the south-west border of the Iranian Plateau, and the ethnology of the Ural Region. The former subject occupied two hours, so that there was no time for the second paper. The student who had made a special study of the Iranian plateau was, I believe, a historical student, who desired to qualify himself through geography, to undertake original historical research. He had evidently made a very complete study of the subject—geographical, historical, commercial, biological, ethnological, archæological. Besides Kiepert's physical map of Asia, he illustrated his monograph with a number of special maps, plans, diagrams, books, &c. The geography included physical, political, statistical, ancient, and modern. Ancient and modern trade-routes were followed; the special physical character of each district, and its special ethnology; the rivers were minutely traced, and their commercial importance considered; the associations connected with Persepolis and other towns; the various industries of the region, and so on.

Richthofen is only beginning his collection of apparatus, but it is already comprehensive though select, and determined by his own special aims. He has several hundreds of maps already, of all sizes and from all countries; maps illustrating special phenomena constructed on Wagner's "Umrisskarte;" a library of the best general and special authorities in the various departments of geography, &c.

Baron von Richthofen's chair appears to me to approach more nearly than other chairs in its methods and subjects to the ideal of an English University chair.

*Professor Kirchhoff's Course.*—At Halle I found Professor Kirchhoff with a very large class of students, most of whom were preparing for the *Facultas Docendi*. His aim is therefore, like that of most other German Universities, mainly to give the students a comprehensive and thorough grounding in the great facts and principles of geography, and at his special class or Übungen, in training them practically in the best methods of teaching the subject. The course extends over four semesters. The first semester is devoted to General Geography, and the other three to special geography, (1) Australia, America, Africa, (2) Asia, (3) Europe. How wide a field is covered by Professor Kirchhoff's lectures may be learned from the fact that the printed abstract or heads of the General Geography occupies 55 pages, small type, while those of Europe occupy 96 pages. For the General Geography a list of about fifty special works is given, under the various headings, for consultation by the students. In the Appendix (N) I give the leading sections of the General Geography, with the books to be consulted in each section, which will give some idea of the extent and depth of the subject as treated at a German University.

I was present when Professor Kirchhoff was lecturing on New Zealand. He spoke of the Maoris, their origin, relations, implements and weapons; the discovery of the country, English colonisation, effect of contact of whites with natives, Christianity, language; the special development of English methods of colonisation; New Zealand a typical example of the English "Culture Colony;" climate and exceptional healthiness of New Zealand referred to; compared statistically with Germany; trade, railways, towns. Professor Kirchhoff then went on to Polynesia, and in connection therewith noticed the formation of Coral Islands, referring to Darwin, Semper, J. Murray,—the *Challenger* and *Gazelle* expeditions.

In the Exercise Class which I attended, a student gave a lesson on Moravia and Bohemia to his fellow-students as if to a class; developed the region on the blackboard from its boundaries inwards, giving details as he went along in all sections of geography. The student was criticised very freely both by his fellow-students and by the Professor. There were thirty-one students at this special class.

Professor Kirchhoff has a large stock of apparatus for all purposes, including a set of apparatus for projections, various models, as of a glacier, a volcanic island, &c.; abundance of ethnological pictures, landscapes, mineralogical specimens, about three hundred maps, several made under the Professor's direction for special purposes; a large stereoscope, &c.

I found in Halle, that besides the general subject taught by the professor of geography, special mathematical and astronomical geography is taught by the professor of mathematics and astronomy.

*Professor H. Kiepert's Course.*—In Berlin, under the eminent cartographer, Professor Kiepert, geography is treated more from the historical

and ethnological side perhaps than in other Universities under younger professors. Besides Dr. Kiepert, there is in Berlin University an extraordinary professor of geography, Dr. F. Müller. Dr. Kiepert informs me that he does not have special exercises in connection with his class; he considers himself too old to begin an innovation which is comparatively recent. In the Appendix (O) I have given the notes with which Professor Kiepert furnished me as to the course of geography at Berlin University.

*Breslau University.*—I give also in the Appendix (P) an interesting and useful communication which has been sent me by Professor Partsch of Breslau. From this, and from what precedes, I hope a satisfactory idea will be conveyed of the position of geography at German Universities. The progress made in twelve years has been great, and in the next twelve years it is bound to be yet greater.

*Commercial Geography in Germany.*—In Germany geography has its place not only in schools and universities, but in such special institutions as commercial schools and war academies. At the Commercial School of Leipzig, which I visited, it has an important place under Dr. O. Hahn. The students here are expected to be grounded in physical and political geography before they enter, though the professor begins with a preliminary course in physical geography. In each of the three years of the school curriculum, geography, with special reference to industry and commerce, has its place two hours each week.

*Geography in the Military Academy.*—By the courteous permission of the Minister of War, I was able to attend the lectures of Dr. Marthe, Professor of Geography at the Kriegs-Akademie in Berlin. This, I believe, is equivalent to our Staff College, and is attended by picked officers, mostly lieutenants. In the "Instruction" for the conduct of the Kriegs-Akademie, the importance of a sound knowledge of political and physical geography, far beyond that with which a youth leaves school to enter the army, is insisted on. (See Appendix G.) Political geography has four hours per week at the Academy, and physical geography two. There is, besides, of course, a class in military geography, which is compulsory. I found over thirty officers attending Professor Marthe's class, and taking notes on the general geography of China, as diligently as if their career depended on the result.

The results of my visits to the various geographical establishments or publishers in Germany, in Leipzig, in Gotha, in Berlin, will be seen in the Exhibition which will be opened in the autumn, and in the catalogue in connection therewith.

I have dwelt thus long on the position of geography in German education because that country has taken the lead in the subject, because it is still considerably ahead of other continental countries, and because these other countries are to a greater or less extent shaping their programme after that of Germany. It will only be necessary, therefore, to refer briefly to what I have learned in Austria, France, Italy, Switzerland, Holland, Belgium, and Scandinavia.

## Austria.

*Geography in Austrian Universities.*—Austria is following fast on the heels of Germany in the extent to which geography is taking its place in all grades of education, and as to the methods adopted in teaching it.

There are professorships of geography at Vienna, Czernowitz, Graz, Innsbruck, Prag; as also at Budapest, Klausenburg, and Krakau. The methods are essentially the same as in German universities, and the ground gone over naturally varies with the predilections of the professors. Professor Simony, with whom I had a long interview, devotes much attention to physical geography. He himself has for years explored the Dachstein mountains, and generally makes them his text for general physical geography. He does not deal much with historical and political geography, which he says his students can obtain from his colleagues. He has a great stock of apparatus, including reliefs and pictures by himself of those parts of the Alps with which he is familiar. He makes distinction between pictures of a geographical and those from an artistic standpoint, and the distinction is well illustrated by his own productions. In Austria, as a whole, however, the field of geography in the universities does not appear to be so extensive as in Germany; it seems, to a considerable extent, confined to Europe, and largely to Austria; physical geography, with special aspects of geographical research, is more dwelt upon than political and historical geography. The tendency undoubtedly is, however, to widen the field in all directions, and treat the subject essentially as it is in German universities.

*Geography in Austrian Schools.*—With regard to Austrian schools, geography has its place in the official programme, from the lowest to the highest, just as in those of Germany. It is still, however, associated to too large an extent with history, and in the Gymnasia seems to be taught as a separate subject only in the lower school. In the Realschulen it has a more prominent place, its actual position here as elsewhere depending partly on the masters. There does not seem to be in Austria anything like the number of trained teachers in geography that is found in Germany. In these as in other respects, however, great progress is being made. In the official 'Instructionen für den Unterricht an den Gymnasien in Österreich,' forty pages

are devoted to minute directions for teaching the subject in all its stages. The directions relative to the elementary stage I have already referred to as given in the Appendix (K).

Some of the best text-books, school wall-maps, atlases, and geographical pictures, come from Austria. The finest series of Geographische Charakterbilder is that published by Hölzel of Vienna, whose wall-maps and atlases, edited by Von Haardt and other cartographers, will bear comparison with the best in Germany. In Austria, as in Germany, geographical education begins with Heimatskunde, and goes outwards and upwards in the higher schools, so as to embrace the whole field. In the Mariahilf Real-Gymnasium, which is in fact a Realschule and a Gymnasium combined, geography is as well taught under the Director, Dr. Schwab, and Dr. Umlauft, editor of the *Geographische Rundschau*, as in the best schools in Germany. In the classes at which I was present the methods were the same as in Germany, and the apparatus abundant. Indeed, this school has one of the best furnished geographical museums I have seen, while its collections in other departments, filling several rooms, are probably unsurpassed for real utility and abundance. For geographical apparatus above 15*l.* yearly are allowed. Besides the Geographische Charakterbilder there are some 500 photographs from all parts of the world, with life-size casts of heads for ethnological teaching; many specimens of the products of different countries; weapons; clothing; minerals; specimens of guano, with photographs of guano beds; ideal section of tropical Atlantic, &c., not to mention a stock of about 100 maps. Dr. Umlauft has drawn up a list of the various objects which he thinks it desirable to add to his geographical collection. This I give in the Appendix (Q), as it may be useful to those who contemplate forming a similar collection.

Here, as in the best German schools, the significance of cartographic signs is carefully taught, and for the purpose Dr. Umlauft has issued a special Atlas, which will be found in the Exhibition.

*The Vienna Commercial Academy.*—Vienna possesses what is probably the leading Commercial Academy in the world, attended by about 900 students, many of them from foreign countries. Under Professor Zehden, geography forms one of the most important branches of instruction in the school, the course extending over three years. As in all the best schools in Germany and Austria, there is a special room for geographical apparatus. Here I found about 150 maps, all of the best class, including special maps from various foreign countries. From ten to twenty new maps are purchased yearly. There are two sets of Hölzel's 'Charakterbilder,' both geographical and historical; Kirchhoff's 'Rassenbilder,' besides hundreds of photos and engravings of cities, seaports, &c., Pick's 'Tellurium,' and other specialities.

There are in this school a one-year's course for students who have taken their leaving certificate at the Gymnasium and Realschule; and a three-years' course for those who wish to have a more thorough training in the subject. In the Appendix (R) I give the programme of the three-years' course, to afford some idea of what is included in Commercial Geography. Dr. Zehden is the author of a large text-book of Commercial Geography, which will be found in the collection for exhibition.

*The Austrian Cadet School.*—One of the most interesting visits I made on the Continent was to the Cadet School at Wiener-Neustadt, which is under the able direction of General Crusič. I was much interested in the methods adopted to train the cadets to have a practical knowledge of surveying, and to be able to read maps accurately and swiftly. General Crusič has been good enough to send to the Exhibition a collection of the models and other apparatus used in the course, which occupies three hours a week for three years. It seems to me that the method (which will be described in the catalogue) used, is an admirable one for training the pupil to have a realistic idea of what a map is meant to teach, and might, in an elementary form at least, be introduced into such schools as aim at making geographical teaching more than the learning of a number of names. The school possesses many beautiful reliefs, and as the corresponding maps are often suspended above them, the students are constantly familiarised with the relation of the map to that which it is intended to represent. Further details concerning this method will probably be given in the Catalogue of the Exhibition collection.

In Vienna, I was permitted to visit the department of the General Staff, the maps produced by which are celebrated all the world over.

## France.

*Recent Progress in France.*—In no country has the progress in geographical education been greater than in France during the last fourteen years. In 1871 Professor Levasseur of the Collège de France, and Professor Himly of the Sorbonne, made an official report to the Minister of Education, the result of personal inspection of the position of geography in French schools and universities. The conclusion was that geography was scarcely taught at all. At the time of the first Republic it had an important place in education, but after that it was subject to great vicissitudes, ending, as the report alluded to stated, in oblivion. As a result a commission was appointed to consider the whole situation of history and geography, in French education, for the two were bracketed. These two reports, with copies of which Professor Levasseur was good enough to present me, are of the greatest interest. But the whole situation

with reference to geography in education in France since the beginning of the century, is well summarised in a brochure of Dr. J. B. Paquier, Professor of Geography at the Lycée St. Louis: 'Étude et Enseignement de la Géographie en France' (Paris, Delagrave, 1884). There also will be found a very useful discussion of the various methods to be followed in teaching the subject. Since the report of MM. Levasseur and Himly, the subject of geographical education has frequently engaged the serious attention of the French Education Department, so that now it finds a substantial place in the programmes of every school. There has always in France been a strong tendency to regard geography as a mere handmaid to history; but the best teachers and best geographers insist now that physical geography should be made the basis of the whole subject. While the official programmes for the various classes of schools are comprehensive enough, the economic and the military aspects of the subject dominate, for reasons obvious enough to those acquainted with the history and social condition of France.

*Geography in French Higher Schools.*—By official prescription Anschauungslehre and Heimatskunde must be taught in primary schools, and for the higher schools the programme is also much the same as that of German schools of a similar class. Both in the earlier and the more advanced stages, however, there seems to me to be a lack of the variety and thoroughness which mark the teaching of geography in German schools. The Heimatskunde, for example, is too often mere topography. In the Appendix (S) will be found the official programme of geography for the French Lycées, which may be held to correspond to our great public schools. There are in France not a few private schools of a high class, but these are compelled to shape their programmes essentially after that prescribed for the Lycées. Such are in Paris the École Alsacienne and the École St. Barbe, the latter one of the most select schools in France. At the École St. Barbe and the Lycée St. Louis I was present at lessons given to the army classes, the pupils who are being prepared for entry to St. Cyr. Here the black-board is everything, the principal features of a country being developed thereon by the professor, similar exercises being imposed upon the pupils. Certain Lycées are more given over to classics than others, and in them the masters are apt to give geography a less important place than it ought to have. Such is, I was informed, the Lycée Louis-le-Grand, where, however, I found a very excellent stock of maps. But the French schools, as a rule, are not so plentifully supplied with maps as German schools; while recently French school cartography has greatly improved, as will be seen from the maps to be shown at the exhibition, there is still a tendency to sacrifice accuracy to artistic effect. Those, however, recently issued by Hachette and Delagrave leave little to be desired. Mlle. Kleinhans'

relief-maps (Delagrave) are found in some schools, and occasionally a series of geographical pictures of French origin, but such luxuries I found to be rare. In text-books also there has been considerable improvement, though there remains much to be done before France comes up to Germany and Austria. The École Turgot, a well-known municipal school, I found to be somewhat like the German Bürgerschule, well equipped both for geographical and science teaching. Paris has also its commercial college, not far behind that of Vienna, in which geography holds an all-important place. Even in the Conservatoire des Arts et Métiers, under Professor Levasseur, it finds its place in the programme.

*French Universities.*—In short, in France, geography is everywhere regarded as a serious study, and is gradually obtaining the place it ought to have in the Facultés de l'État. Professor Himly, who is professor of geography at as well as Dean of the Sorbonne, has a course which, while closely associated with historical development, gives due place to the physical aspects of geography. At the time of my visit he was lecturing twice a week on the physical, historical, and political geography of Southern Europe. At the Collège de France, although M. Levasseur is professor of economical geography and history, he knows how to avail himself of the whole field of his subject. His brochure on 'L'Étude et L'Enseignement de la Géographie' (Paris, Delagrave, 1872) deserves the study of all interested in the subject. In the Appendix (T) will be found the heads of his course for 1884–5, which he was good enough to write out for me. M. Ludovic Drapeyron has also done much in the *Revue de Géographie* to obtain for geography a worthy place in France, though his efforts to establish a Geographical University must be regarded as Quixotic.

In the provinces we find chairs of geography at Bordeaux (founded 1876), Caen (1873), Lyon (1876); of history and geography at Clermont, Dijon, Nancy and Toulouse. The tendency is rightly, in Universities at least, to separate history and geography; and doubtless when the Chairs in these latter Universities have again to be filled up, geography will have in each a professor to itself. For the Baccalauréat-ès-Lettres, geography of a fairly advanced character forms an obligatory part of the examination, and in addition to Cosmography enters into that for the Baccalauréat-ès Science.

*Geography in French Military Schools.*—Both for admission to the special military school at St. Cyr and to the naval school, the examination is severe, far more severe than we have at any stage in this country. Both at St. Cyr, and at the École Supérieure de Guerre at Paris, geography forms one of the most important subjects of education. In the Appendix (U) will be found the subjects prescribed for the

entrance examination to St. Cyr, which is severe enough; and for the school of war the examination is still more severe. The latter corresponds to our Staff College, and under Colonel Niox, who has charge of the geography, the subject has assumed the first importance, and it is greatly owing to his influence that it is gradually being placed on a sound basis in the higher schools. Colonel Niox was good enough to conduct me all over his class-rooms, which are many. The walls are covered with maps of huge dimensions of all European countries, executed by himself and his students on cheap black paper with chalks, and exhibiting all the features of the countries in minute detail. The map of Belgium, for example, must be about fifteen feet square. Here it is not merely military geography that forms the subject of education. Colonel Niox is the author of a geographical treatise in five volumes, which will be found in the Exhibition Collection; this is the text-book which is used in the school of war. No doubt its ultimate object is military geography, but an examination of the work will show that such special geography is based on a wide and profound study of physical and general geography. At St. Cyr, I am informed, the course is similar, though not quite so far advanced; general geography occupying a place of equal importance with other subjects. In Appendix U* will be found various papers relating to geography in the École Supérieure de Guerre, which have been kindly placed at my service by Colonel Niox.

*French Normal Schools.*—In France there are Normal Schools, not only for elementary teachers, but also for those aspiring to be teachers in the higher schools. These, to some extent, fulfil the functions of the geographical chairs in German Universities, though I could not find that all teachers of geography have necessarily had a special training in the subject and its methods. At the Superior Normal School in Paris, I found that geography occupied one hour per week, under Professor Vidal de Lablache. It is still, however, combined with history, though Professor de Lablache is strongly impressed with the value of physical geography as the substratum of all other sections of the subject. There is a good stock of maps, physical and political; the black-board has important functions, and there are exercises in method as in the German Universities. M. de Lablache has edited for Colin a series of special wall-maps, which will be found in the Exhibition Collection. He admits, however, that both French text-books and French atlases, especially the latter, leave much to be desired. There are really no first-rate school atlases of French origin.

*The Musée Pédagogique.*—The beginnings of a Musée Pédagogique have been made in Paris, in the Rue Louis Thuillier; and I found, when I visited it, that the most prominent exhibits are in geography. A collection of maps, models, pictures, ethnological figures, reliefs, and

other geographical apparatus, has been made from all parts of the world. Such a permanent museum must be of the greatest service to teachers desirous of keeping their apparatus up to the highest standard. I found, among other things, several very good large reliefs, made by the pupils of various normal schools, of the district, arrondissement, or department in which their school was situated.

There can be no doubt that geography has, during the last fourteen years, rapidly taken its place as a serious study in all French educational establishments. There is still room for improvement as to methods, and the subject is still too often regarded as only an adjunct to history. But these defects are certain to be remedied, and in time France, in this respect, will be on a par with the most progressive country in Europe.

## Italy.

*General Position.*—What has been said of France applies equally to Italy. The progress of education in that country in recent years has been of the most radical and hopeful character. All the best features and best methods of Germany have been imported, and maps of German origin, with Italian nomenclature, have been largely introduced. An idea of the present position of the subject may be obtained from the Normal School programme, which will be found in the Appendix (V). Under the guidance of Professor Dalla Vedova, Professor Cavaliere Guido Cora of Turin, Professor Malfatti of Florence, and other geographers, the Italians are themselves producing series of school wall-maps and atlases, some of which will bear comparison with the best products of Germany. Not only so, but in the matter of relief-maps Italian publishers are perhaps the most enterprising in Europe. Two Turin firms produce their maps in immense quantities, both for Italy and for other countries; specimens will be found in the Exhibition. Some of them are carefully and accurately and beautifully executed; others, I fear, cannot be commended; they are too small, and are made in the roughest manner by unskilled mechanics. But the fact of this wholesale manufacture of reliefs is one among other signs of the great importance given to geography in Italian education. The Ministry of Education is exceedingly liberal in the matter of apparatus; 200 copies of the large relief map of Italy have been presented to the Lycées. The progress has, however, been greater in elementary than in the higher schools, though in the latter the subject is gradually finding a place similar to that which it has in France. At the Technical School of Alessandria, and the Naval and Technical School of Genoa, the subject is particularly well cared for. The Military School of Turin is well provided with reliefs and other apparatus, though general geography has not the important place there which it has in the French military schools.

*Italian Universities.*—There are professors of geography at Rome, Naples, Florence, Genoa, Bologna, Milan, Padua, Palermo, Pavia, Pisa, Venice, and Turin. I found that at Turin Professor Guido Cora has a course somewhat similar to that which I found in most German Universities. The Chair is recently founded, and he is therefore only beginning to accumulate a stock of apparatus. For the general lectures he has sixty students, and for his special lectures fourteen. In Italy geography forms a necessary part of the examination for the degree of Doctor in Philosophy. The professors of geography are on exactly the same footing as other professors.

## SWITZERLAND.

*General Position.*—In Switzerland each canton has to a large extent the regulation of its own educational institutions; hence it happens that we find considerable differences in the progress of education in different cantons. In the more advanced cantons, notably in Zürich, Bern, and Basel, we find geography occupying an important place in the school programmes.

Except at Zürich, I believe there are no professors of geography in Swiss Universities. Dr. Kappeler, the President of the famous Polytechnic of Zürich, informed me that there they wished to have a professor of geography, but found it difficult to get a good man. It is by Prof. Heim, of the Polytechnic, and also by his former pupil, Dr. Imfeld, that those beautiful reliefs are made, some of which will be found in the Exhibition.

In the canton of Zürich, which may be taken as representative of the most advanced cantons in Switzerland, education of all grades is minutely provided for by the central authorities, and in all schools—primary, secondary, Realschulen and Gymnasia, as well as normal schools—geography has its place, though in the higher schools, Gymnasia especially, it has not the important place it has in the lower schools. The method is that of Germany with improvements in several points.

*Heimatskunde at Zürich.*—The Heimatskunde of Zürich is of the most comprehensive and instructive character, and, in the hands of good teachers, cannot fail to be an excellent training both for the observing and thinking powers, and as a solid basis for further progress in natural knowledge. The text-book in use,—'Zürich und Umgebung: Heimatskunde herausgegeben von Lehrerverein Zürich,' is the work of several specialists. The topography is by J. J. Müller; geology, Professor Heim; climatic conditions, Rector St. Wanner; flora, Conservator J. Jäggi; fauna, Dr. C. Keller; historic development, Dr. O. Hunziker; historical and artistic monuments of Zürich town, Prof. Vögelin; Zürich's intellectual position since the Reformation, Dr. U.

Ernst; customs and public fêtes, Dr. Rud. Schoch; stories and legends, H. Wegmann; specimens of the Zürich dialect; manufactures, trade, and commerce, Fr. Zöllinger; charities, H. Wegmann; education, Fr. Zöllinger; walks, K. Kreis and J. J. Schneebeli; statistics, H. Spühler.

This will give some idea of the subjects which, in the conception of Zürich teachers, is included in Heimatskunde—in elementary geography. The contents of the book are amply and beautifully illustrated in the Permanent School Museum in Zürich town, much of which is occupied with geographical objects. Here we find many reliefs of Switzerland, and parts of Switzerland. For Zürich there is first a relief of the town and district around; many fine photographs of Zürich, its public monuments, and notable scenes around; a series of historical views of Zürich; several old reliefs; historical series of maps; specimen of rocks, plants, animals, industrial materials in all stages; besides general geographical pictures and apparatus of all kinds.

In a combined primary and secondary school which I visited, and where I was present at a lesson in Heimatskunde (subject, the Canton, each pupil having his linen map), there is probably one of the finest combined museums and laboratories to be found in any school. I found a collection of all the plants and animals of Switzerland; a large stock of excellent maps, reliefs, geographical pictures of various German publishers, geological specimens, &c.

*Zürich Higher Schools.*—In the Industrie-Schulen (corresponding to the Realschulen of Germany) the subject is still more detailed and complete than in the primary school. The reading of maps is enjoined in the official directions to be carefully taught, and the method which I saw at work in a secondary school seemed to me particularly effective. In the beginning of Wettstein's beautiful atlas (about 30 of Randegger's fine maps for 2*s.* 6*d.*) are a few special maps, about 6 in. by 3 in., representing different kinds of country, and different methods of exhibiting the hill-features. They are very carefully drawn, with contour lines combined with different modes of shading. The pupils construct from these, by means of thin cardboard cut out for each contour line, models or reliefs. By this method they come to have a very real idea of what a map is meant to represent. Specimens of these, by a class of pupils about twelve years of age, will be found in the Exhibition. When I was present this class was having a lesson on Australia. One exercise was to measure with their graduated centimetre scale the distance along the coast, taking in the indentations from Brisbane and Melbourne, and calculate it out in kilometres on the map scale. This they all did rapidly, and with wonderful correctness. They evidently understand clearly what a map scale is. Wettstein's atlas and text-book is in general use in Zürich and in other cantons as well. Here, as in Germany, the text-book occupies a subordinate place,

and the teacher is everything. At the Normal School, of which Dr. Wettstein is rector, teachers receive the very best training in the subject and methods of teaching geography, as well as natural science generally. It is worthy of note that in Zürich, at least, geography is bracketed with the natural sciences rather than with history, and physical geography has a correspondingly important place. At the Normal School, Dr. Wettstein himself teaches physical geography, political geography being left to the professor of history.

Randegger's (of Winterthur) maps are probably unsurpassed, and such as he publishes are in general use. But I found also many of the best German maps, notably those of Reimer of Berlin. The method of building up reliefs with sand is also in general use, and in a secondary girls' school I saw the pupils build up a relief of the mountain systems of Great Britain. I found in the Zürich schools that the magic-lantern is used very effectively for geographical, as for other purposes.

*Swiss Cartography.*—At Winterthur I visited the cartographic establishment of Randegger, and inspected some of his beautiful specimens of cartography. I found him engaged on a fine map of Canton Basel, ordered by the Education Council for Basel Schools. It measures 1·10 metre by 1·30 metre, and is intended to imitate relief. It gives the contour curves with mountain shading, the light coming from the north. He was also engaged on a very beautiful relief of Switzerland, with the two scales identical, and built up with paper. It is about two feet square. He has also several other fine reliefs, all of true scales. Several of Randegger's best productions will be found in the Exhibition.

*Industrial Schools.*—I also visited the Technicum (Cantonal Technical School) at Winterthur. For students intending to devote themselves to commercial pursuits, both general and commercial geography is obligatory, and is taught by means of the professor's lectures. There is a large collection of maps, geographical pictures, photographs, mineralogical, botanical, and other collections.

*Geneva.*—Through the kindness of Colonel Gautier, of Geneva, I have received a statement of the practice of the subject in that city from M. P. Chaix, late professor at the Gymnasium; this will be found in the Appendix (W).

## Belgium.

*Belgian Universities.*—In Belgium, geography as such has no place in the Universities. In Liége there is a professor of Industrial Geography; but Professor Du Fief of Brussels believes that professorships of the general subject will shortly be established in all the Universities.

*General Regulations.*—I have already given an example of how Heimatskunde is taught in Belgium. In that country—as in other countries on the Continent—education of all grades is considered of sufficient national importance to be cared for by the State, and in the official programme of all schools the teaching of geography is especially provided for. In the regulations for primary schools, minute directions are given for instruction in Anschauungslehre and Heimatskunde, proceeding outwards to elementary notions of general geography. In the final examination of students at primary normal schools, out of 600 marks given for thirteen subjects, thirty-five are allotted to geography. For superior schools the teachers have to undergo a written and oral examination in geography and history in order to obtain their teaching diploma in these subjects.

*Higher Schools.*—For the Athénées Royaux the course prescribed is exceedingly complete. The curriculum at the Athénées lasts three years, and geography is taught throughout, although only for one hour per week. What that course is will be seen from the programme given in the Appendix (X). In the middle-class schools, in which the course is three years, geography is taught each year, the programme being a modification of that of the Athénées. It is enjoined in the official regulations that history and geography be taught in a special room, provided with illustrative objects of all kinds, photographs, engravings, reliefs, atlases, maps, globes, &c.

In Brussels, as in Paris and Zürich, there is a State Musée Scolaire, under M. André Devos, with a very large collection of maps, globes, reliefs, and other apparatus, including some very large scale maps of Belgium, and a series of fourteen maps for Heimatskunde, and for teaching the pupils to interpret maps.

The method in the higher schools is much the same as in Germany, the text-books in use being mainly those of Prof. Du Fief.

## Holland.

*Dutch Universities.*—With regard to the position of geography in the universities of Holland, I have received the following statement from Prof. Kan, of Amsterdam:—

"In the State Universities there are no special professors of geography. Physical geography is taught in the faculty of mathematics and physics by the professor of physics; political geography in the faculty of literature and philosophy by the professor of history. The comparative value of geography on examinations is very little. Students in classical literature to acquire the degree of doctor, are submitted to an examination in the Universal History of Antiquity, *and in connection with this*, geography. Students in Dutch literature to acquire the degree of candidate, preceding that of doctor, have to submit themselves to an examination in the Universal History of the Middle Ages and Modern Times, *and in connection*

of geographical education, the supply of maps was as abundant, and their quality as high, as in any German school. In Holland, special attention seems to be given to economical geography, and the atlas of the Netherlands of Posthumus and Van Bemmelen shows, in a very striking way, the connection between the physical condition of the surface and its industrial uses.

In Amsterdam also is an educational museum, the most prominent exhibits in which are those relating to geography—maps from all countries, reliefs, globes, atlases, &c.

In should be mentioned that at the University of Leyden there is a professor of the geography and ethnology of the Dutch East Indies—Professor Veth, who has retired since my visit.

## Sweden.

Dr. Dahlgren of the Swedish Society of Anthropology and Geography, has been good enough to send me the following statement as to the position of geographical education in Sweden:—

*The National Schools.*—In the year 1883 there were 9,781 National Schools with 11,749 teachers, and 601,961 pupils (children from seven to fourteen years; attendance compulsory). In the first stage of the National School, the so-called infant school, there is no other geographical teaching than that which enters into *Anschauungsunterricht*, prescribed in the "Normal Plan." The schoolmistress (in these schools all the teachers are female) ought to give oral descriptions of the scenery of the neighbourhood in which the children live, thus presenting the most common geographical features, as hill, plain, lake, river, sound, &c., to the observation of the children. In the National School proper, the course in which comprises four years, unless local circumstances make it necessary to shorten the period, geography is taught in all the classes. In the three lower forms, two hours out of twenty-six per week are devoted to this subject, and in the highest form one hour weekly. The annual schooltime is from thirty to thirty-six weeks. The system of geographical teaching is as follows:—first the children are made well acquainted with their own parish or town and their own province; then they learn the essential features of the geography of Sweden; and finally they pass to the study of foreign countries and parts of the world. At the highest stage of the school, the geography of Sweden is gone over again with more detail. In the "continuation-school" (attendance not compulsory) where such pupils receive instruction as have passed through the compulsory course of the National School with good testimonials, geography has no place in the list of subjects.

in those with five years' course there are two hours per week in the first three years, and one hour per week in the last two years.

The following is the programme of the Higher Burgerschool of Leyden :—

"For entrance there is required a thorough knowledge of the boundaries and rivers of the Netherlands. A knowledge of the principal soils and productions in the different provinces of the Netherlands. The candidate must be able to point out on a map without names the different countries of Europe, and have a general knowledge of their boundaries. The seas of Europe and the relative position of the continents.

"The programme of instruction is as follows :—

"1st class.—Europe, and in particular the Netherlands. A summary of the first elements of physical geography. Longitude and latitude. Land and water. Elevations and depressions of the earth's surface. Development of the coast; the sea and its ports.

"2nd class.—Asia, especially the Dutch Colonies in the East Indies.

"3rd class.—Africa, America, and Australia. Recapitulation.

"4th class.—Elements of physical geography; phenomena in the atmosphere; distribution of heat, wind; the circulation of water in the air, &c.; influence of water upon the earth; springs, the sea, formation of valleys, &c. Distribution of plants and animals over the earth. Recapitulation.

"5th class.—Ethnography. Recapitulation.

"Three hours per week are given in the first year, two in the second and third, and one in the fourth and fifth.

"In order to obtain a certificate at the end of the curriculum, there is required :—

"*Elements of Cosmography.*—The examination in Cosmography embraces the shape and dimensions of the globe, the way in which they are determined, the fixing of the position of places on its surface, the phenomena arising from the rotation of the earth round its axis, from the revolution round the sun of both the earth and the planets, and from the motion of the satellites; the laws of motion and universal gravitation; some knowledge of the comets, as also of the fixed stars, as far as the determination of their distances and their own motion are concerned; the nebulæ and the milky way.

"*Geography.*—The mathematical part of geography has been mentioned above under Cosmography. To natural geography ought to be added the knowledge of climates, marine currents, prevalent winds, the distribution of plants, animals, and races of men over the surface of the earth. The examination further comprises a synopsis of the political division of the continents; the boundaries and the natural condition, the administration, the industry, the commercial relations of the principal countries, and especially in regard to the Netherlands and their colonies."

This school is well supplied with maps, pictures, and other *matériel*. In the corresponding institution, which I visited in Amsterdam, I found the conditions similar, and the method of teaching like that of Germany. In the commercial school at Amsterdam, geography general and special occupies a prominent place, and the supply of maps and other apparatus plentiful and good. At the Normal School also it has a most important place, and the students are trained to teach Heimatskunde in the primary schools. In a Burgerschool, with three years' course, the head-master of which is Dr. Posthumus (since dead), who has made a special study

*General Conclusions as to the Continent*—Thus it is evident that geography has a serious place in education of all grades on the Continent, and that in Germany, Austria, Italy, France, and Holland, there are professors of the subject at certain of the Universities. The Government of every country I have visited insists that it should be so. Geographical specialists complain that it has not in the higher schools the time allotted to it which it ought to have, and that there is a lack of properly trained teachers. The time, in my opinion, could not be much more than it is at present, and if the carefully-arranged programmes are thoroughly carried out by competent men, boys ought to leave the higher Continental schools with a very solid knowledge of geography indeed. As to teachers, well-trained men—men who have taken the course and passed the examination for the *Facultas Docendi* in geography—are becoming commoner every year under the influence of the Universities. In short, we find generally present in the Continental systems of geographical instruction all the elements of development and success.

## NORTH AMERICA.

*United States.*—I have a communication from the Hon. John Eaton, United States' Commissioner of Education, informing me that he is obtaining the data desired for the United States. He sends me a circular which has been distributed among the teachers of the States, and which reproduces the President's Letter and the Memorandum of Instructions, together with a series of questions bearing on the object of the inquiry. Mr. Eaton, however, states that the information may not be obtained in time for my Report.

*Canada.*—Mr. Ravenstein has kindly sent me a few notes of a visit he paid, while in Montreal last year, to Montreal Protestant High School, when he was present at a lesson in geography. That school consists of a preparatory department of two classes, with a course extending over four years, and of the high school proper, in six forms, with a total course of four years. Only about one-twentieth of the whole school-time is given to geography—one hour per week. The text-books used are Calkin's 'Introduction to Geography,' and the same author's 'School Geography of the World.' Dr. Kelley told Mr. Ravenstein, however, that most of the lessons are oral, and that the text-books are but little used. "As to maps, the less said about them the better."

Mr. Ravenstein questioned a class on some points of local geography, and gives on the whole a favourable report of the result.

Dr. Channing, Lecturer on History at Harvard College, whom Mr. Ravenstein met at Montreal, told him that geography was dealt with in a very unsatisfactory manner in the American schools, and that his students were frequently quite unacquainted with it, thus compelling him to deal with the subject occasionally himself.

## Conclusions and Suggestions as to the Position of Geographical Teaching in England.

As to our own country I hope I have made the position plain enough. The elements of success in geographical instruction are wanting; there is no State Department, and no central body to legislate for schools above the primary grade. I cannot summarise the situation of geographical education more clearly than by quoting the words already given from an educational authority:—

"(1) In Universities it is nil. (2) In Public Schools very nearly nil, as the Society's examinations for their medals have proved. And when it is attempted, it is given to the most incompetent master, and he has a wretched set of maps. (3) It is required for the Public Services, and taught, I do not know how, by crammers. (4) The only places where geography is systematically taught in England are the Training Colleges, male and female, and the National Board Schools; with now, and for the last few years, some few good High and Middle-Class Schools."

In the matter of geography the Universities at present exercise no influence except through their local examinations. Teachers and examiners both stand in need of enlightenment, and unless the Royal Geographical Society takes some step, nothing is likely to be done.

It is not proposed that the Geographical Society should attempt to occupy the place assumed abroad by the State. Such a step might not be in accordance with our educational traditions, and would hardly prove successful. But it appears to be in the power and within the scope of our Society to supply the necessary impulse to induce the bodies that rule or direct the course of British education to take up geography in an intelligent spirit.

This may best be done by securing the voluntary co-operation of the great Universities, together with the Universities Schools Examination Board, the Examiners for the Army, Navy, and all public services, and other similar bodies.

As to the Universities, the value of geography in connection with several of the most prominent existing studies there, is generally admitted by University men themselves, as will have been seen from what has been said above in reference to English Universities. To effective research in history, we are granted, it is indispensable; in the illustration of ancient literature, and classical literature especially, it is most valuable. Geology, botany, zoology, physics in its widest sense, have all important geographical aspects. But at present the bearings of geography on all these various subjects are almost entirely unworked, simply because historical, literary, and scientific specialists have no time to carry their researches beyond the very beginning of the geographical field. What can be done on behalf of all the departments mentioned, by men who make geographical research their occupation, has been

demonstrated in Germany; and in the preceding pages as well as in the Appendix, I hope I have given some idea of what is actually being done. If, then, the Universities encouraged in their examinations some real recognition of the geographical bearings of those subjects which admit of it, this would be reason enough for the admission of the study to the professoriate. On the higher schools such a step could not fail to have a powerful influence.

How the Universities are to be approached is for the Council to consider. The Council might consider the advisability of appointing a small Committee to draw up a definite proposal for the establishment of lectureships in the Universities. The Committee would require to define the field of geography as a subject for such recognition; would have to go before the University authorities with a definite programme in their hands of what they wished to be done. With such a programme to present, a strong personal appeal might be made to the Vice-Chancellors to have the matter taken into serious consideration by the proper authorities; such an appeal might be supported by a memorandum signed by men of influence and position in various departments of science and learning who are of opinion that geography deserves a place in the list of subjects actively encouraged by the Universities.

If the Council could suggest one or two men capable of working out the subject in a manner worthy of a University chair or readership, the appeal would be all the more likely to be effective. Meantime, perhaps it would be possible to obtain permission for the delivery at Oxford and Cambridge, and at other Universities, of a short series of lectures, by one or more qualified men, who could be depended upon to give practical illustration of what might be made of geography at the Universities. I have already made a suggestion as to whether it might not be possible to have a Geographical Rede Lecture; and if a competent man could be found, a man of adequate knowledge and sound well-balanced judgment, opportunity might be taken of giving some clear ideas of what geographers would propose to include in the field of their science.

No doubt, also, if the standard for geography in the examinations for all our public services were raised, it would have some effect both on schools and Universities.

The examining bodies for the public services and the army and navy will, it may be hoped, be influenced to give their best consideration to the comparative position held by geography in England, by a perusal of the Appendices, showing what is being done by similar bodies on the Continent, as well as by the Exhibition of maps and appliances in use abroad to be held in the autumn. They will surely consider it desirable that those they send out should, when they come to meet foreigners in commerce or politics, or in war, be not less well instructed in a department of science which in recent years has had so large a bearing on all these national concerns.

So far as our schools are concerned, the two great weaknesses seem to me to be want of knowledge in the teachers, and want of organisation in the programmes and methods.

To quote from a letter addressed in February, 1884, by the Rev. E. Hale, of Eton College, to the Council:—

"The point to be aimed at by the Royal Geographical Society is to teach those who will have to teach geography in our higher schools. The head-masters would like some geography to be taught because parents desire it, but few if any of their assistants care at all about it, or take any trouble in the matter. There have been various attempts to introduce a better system of geographical teaching by schoolmasters, and the two desiderata have always been that the schools want proper plant and good teachers. Every Swiss school is better provided than Eton and Harrow. German schools suffered as much as we do, until Karl Ritter was made professor of geography at Berlin, when teachers had to attend his lectures, and you now know what good geographers the North Germans are. The study of geography as a mental exercise is denounced by schoolmasters because they do not understand the sense in which science employs the term."

If the hours now nominally allotted to geography of all kinds in our higher and middle-class schools were fully utilised, under the care of qualified men, working on a programme so adjusted as to embrace, after some sort of scientific method, the whole field of the subject in carefully graduated stages, great improvements would result.

It would not, I think, be beyond the functions of this Society to suggest a graded programme for geographical teaching, similar to those in use in Austria, France, and Germany, embracing all primary, middle-class, and higher schools, and all classes in these schools. This might be all the more effective if the Council obtained the co-operation of the Universities Schools Examination Boards and of practical teachers interested in geography. Moreover, it might be combined with a revival of the Medal Awards, in a modified form—in a form that would encourage more competitors to come forward, the examinations to be based on the programme I suggest.

To carry out such a programme would require trained teachers, and text-books, maps, and other apparatus of a character superior to those at present obtainable in this country.

As to what the Society might do to induce teachers to qualify themselves to teach the subject effectively, that is a difficult question. Except for our primary schools, there are no means whatever in this country of training teachers for their work. On the Continent, either at the Universities, or at Superior Normal Schools, those desirous of qualifying themselves for the teaching of geography, have ample opportunity for doing so. No such facilities exist in this country. Meantime, if a sufficient audience of the right kind could be assured, short courses of special lectures on the educational field and methods of geography might arouse a desire for improvement among teachers themselves. An

experimental course of this character might be held in connection with the Exhibition.

The Council might encourage the production of text-books and atlases, framed in accordance with their scheme, by offering to affix their imprimatur on any which seemed to satisfy their requirements. Such an approval would involve no commercial responsibility, and at the same time the prospect of it might induce publishers the more readily to undertake the production of works such as are indispensable to any real progress in geographical education.

Finally, I hope that the work I have done under the Society's guidance, resulting in the present report and the forthcoming Exhibition, may not be entirely without fruit.

## The Exhibition of Geographical Appliances.

As it has been decided to postpone the opening of the Exhibition of the collections I have formed until November next, I reserve any details concerning the various classes of objects for the Catalogue, which will be issued in connection therewith. I may only say now, that the collection has grown far beyond what was originally expected. I found such an abundance of *matériel* of various kinds in use on the Continent, that I felt compelled to make the collection somewhat large in order that it might be representative. I have sought to obtain specimens of the best apparatus in use in the various countries; text-books, atlases, wall-maps, diagrams, geographical pictures, globes, telluria, reliefs, &c. Among foreign houses who have kindly either lent or presented their productions for exhibition, I may mention those of Hachette, Delagrave, and Colin of Paris; Reimer and Schotte of Berlin; Perthes of Gotha; Artaria and Hölzel of Vienna; Felkl and Sons of Prag; Sacchi of Milan, and Roux and Favale of Turin; Würster and Randegger of Zürich; Fischer of Cassel; Hirt of Leipzig and Breslau; Brinkman of Amsterdam; Professor du Fief of Brussels; Norstedt, Flodin, Seligman, Carlssen, Fritze, and Breijer of Sweden, as well as the Swedish Society of Anthropology and Geography.

Also I must acknowledge the contributions of the Austrian War Department, sent through General Crusič, and those of the leading geographical publishers in our own country.

These collections will probably take up considerable space; but if, as is expected, accommodation be obtained in the Albert Hall, or one of the adjoining Galleries, there will be no difficulty in displaying the objects satisfactorily. It is hoped that by having the Exhibition open from November till January, those for whose benefit it is specially intended may be able to visit it, and so obtain a knowledge of the varied apparatus at the command of those desirous of improving geographical teaching up to the Continental level.

# APPENDICES.

## A.

### LIST OF BRITISH SCHOOLS DEALT WITH BY THE INSPECTOR.

London:—
- *Christ's Hospital.
- *City of London School.
- *King's College School.
- London International College, Spring Grove.
- *Merchant Taylors'.
- *St. Paul's.
- *University College School.
- *Westminster School.
- *Royal Naval School, New Cross.
- *Bedford College for Ladies.

St. Peter's College, Radley, Abingdon.
Bedford College.
*King Edward's Schools, Birmingham (5).
Brighton College.
*Bristol Grammar School.
*Charter House, Godalming.
Cathedral Grammar School, Chester.
Cheltenham College.
*Clifton College.
*Dulwich College.
*Eton College.
Haileybury College.
*Harrow.
Hurstpierpoint.
*Liverpool College.
*Liverpool Institute.
The College, Malvern.
*Manchester School.
Marlborough College.
University School, Nottingham.
High School, Nottingham.
Repton.
Rossall.
*Rugby.
King's School, Sherborne.
Shoreham.
Shrewsbury.
Stonyhurst College, Blackburn.
The School, Tunbridge.
Uppingham School.
Wellington College.
Winchester College.
Victoria College, Jersey.
Aberdeen Grammar School.
Edinburgh:—
- *Academy.
- *High School.
- *George Watson's College.
- Fettes College.

Glasgow:—
- *High School.
- *Academy.

## B.

### 1.

### EXTRACT FROM A LETTER SENT TO THE VICE-CHANCELLORS OF THE UNIVERSITIES OF OXFORD AND CAMBRIDGE, FROM THE PRESIDENT AND COUNCIL OF THE ROYAL GEOGRAPHICAL SOCIETY.

. . . . We would point out the special importance of geography to Englishmen in the present age. The possession of great and widely-scattered dependencies, the

unprecedented extension of our commercial interests, the increased freedom of intercourse and closeness of connection established by means of the steamship and the telegraph, between our country and all parts of the world, the progress of emigration binding us by ties of blood-relationship to so many distant communities, —all these are circumstances which vastly enhance the value of geographical knowledge. Great as its utility has always been, an acquaintance with the grand routes which commerce has followed or is likely to follow—of the conditions under which civilization has succeeded or is likely to succeed—is far more useful now than it was in past times, when those traditions were established which influence the education of the present day.

The use of geography in different professions has been so often alluded to in detail, that it becomes hardly necessary for us to enlarge upon it here; but it is a subject on which we, as the executive body of the Royal Geographical Society, feel ourselves justified in expressing a general opinion, because we know that among the Fellows of our Society are many of the foremost men in every one of the careers by which the greatness and the varied national life of England are maintained. The association of such men in the pursuit of geography is evidence of the importance of that science in the education of the most valuable classes of English gentlemen.

We speak of geography, not as a barren catalogue of names and facts, but as a science that ought to be taught in a liberal way, with abundant appliances of maps, models, and illustrations. We feel that we have earned a right to express an opinion, that geography admits of being so taught and of being made the subject of scientific examination, by the experience we have gained, through the establishment of certain prizes by us for exceptionally good geographical attainments, among the boys of first-grade schools. We find, as a matter of fact, that geography is exceedingly well taught at some few large schools, and that, unless it is very ill taught, it is everywhere apt to become a popular subject with both masters and boys. We also find that examinations in geography are capable of testing much more than the memory; they give evidence of clearness of apprehension and of power of statement, of breadth of view, and of style in composition. It may be worth mentioning that, having assigned extra marks for maps and sketches, though only so far as they are effective illustrations of what cannot otherwise be easily expressed, we have observed in some cases, that this indirect encouragement to drawing has borne most satisfactory fruit.

We look to the Universities, not only to rescue geography from being badly taught in the schools of England, but to raise it to an even higher standard than it has yet attained. It appears to be directly within the powers given to them by the proposed Examination Scheme to do so. They can improve the quality of the examinations, they can report on efficient and inefficient teaching, and, in this way, steadily develop geographical science into the form most suitable for the education of boys. Then, in a school well furnished with appliances for geographical teaching, the mere elements, which all ought to know, would be learnt in early boyhood with trifling difficulty, while the more advanced knowledge which older boys would require, who elected geography, either physical or political, as one of the subjects of their examination, would be obtained without waste of effort, and without burdening the memory with names to which no corresponding image existed in the mind. Geography so taught would appeal strongly to the imagination; it would be found to abound in instructive generalizations, and it would vastly increase the range of a schoolboy's interests and his materials for after reflection.

(Signed) H. C. RAWLINSON, PRESIDENT.

July 3, 1871. *On behalf of the Council of the Royal Geographical Society.*

2.

## DRAFT OF A MEMORIAL TO BE SENT, WITH SEPARATE COVERING LETTERS, TO H.M. COMMISSIONERS OF THE UNIVERSITY OF OXFORD, TO THOSE OF CAMBRIDGE, AND TO THE GOVERNING BODIES OF EITHER UNIVERSITY. [1874.]

The Council of the Royal Geographical Society desire to take advantage of the opportunity afforded while the scheme of teaching in Oxford and Cambridge is under consideration, to urge on the proper authorities the establishment of Geographical Professorships at both Universities. The claims of geography to be thus represented appear to the Council to be both weighty and numerous. They are briefly set forth in the following memorandum.

In speaking of geography the Council use the word in its most liberal sense, and not as an equivalent to topography. The word Geography, they desire it to be understood, implies a compendious description of all the prominent conditions of a country, such as its climate, configuration, minerals, plants, and animals, as well as its human inhabitants; the latter in respect not only to their race, but also to their present and past history, so far as it is intimately connected with the peculiarities of the land they inhabit. Each locality has its characteristic features, which it is the province of the geographer to describe with the utmost possible clearness. He should convey to others the salient ideas that could not otherwise be acquired except by a highly-skilled observer in all branches of knowledge, after a long residence.

Scientific geography does not confine itself to such a description of separate localities as may be found in gazetteers. Having collected similar cases, it proceeds to group them together. It studies antecedent conditions, and concerns itself with the actions of concurrent phenomena upon one another in the same locality, showing why they tend to stability, and to give to each country its characteristic aspect. Thus the geographical distribution of plants and animals, and the light it throws on the early configuration of the surface of the earth, is one of the very many problems with which scientific geographers are accustomed to deal. Another of the problems is concerned with the reciprocal influence of man and his surroundings; showing on the one hand the influence of external nature on race, commercial development and sociology, and on the other, the influence of man on nature, in forest destruction, cultivation of the soil, introduction of new plants and domestic animals, extirpation of useless vegetation, and the like. This mutual relation of the objects of the different sciences is the subject of a science in itself, so that scientific geography may be defined as the study of local correlations.

Geography, thus defined, does not tend in any degree to supersede the special cultivation of independent sciences, but rather to establish connections which would otherwise be unobserved, and to intensify the interest already felt in each of them, by showing their general value in a liberal education. It is through geography alone that the links can be seen that connect physical, historical, and political conditions; and it is thus that geography claims the position of a science distinct from the rest, and of singular practical importance.

It may perhaps be objected that geography in this sense is too wide a subject, that its limits are too uncertain, and its science as yet not sufficiently rigorous to justify its recognition at the Universities by a special Professorship. Precisely the same objections might however be urged against a Professorship of History, yet no one seriously entertains them. A practical answer to any objection against founding a University Chair of Geography is that Professorships have already been established with excellent results in many places on the Continent. A Professor of Geography has existed in the University of Berlin since the days of Carl Ritter;

similar Professorships are established at the Universities of Hallé, Marburg, Strasburg, Bonn, Göttingen, and Breslau. In Switzerland they are established at Geneva, Neuchâtel, and Zürich. In France, Geographical Chairs, under the control of the University of France, are attached to the Facultés des Lettres at the following towns—Paris (Sorbonne), Bordeaux, Caen, and Lyons; at Clermont-Ferrand and Nancy the Chairs of History and Geography are united; at Marseilles a Professorship of History and Commercial Geography is attached to the Faculté des Sciences. There are, therefore, in all seven Chairs of Geography in France endowed by the State. This provision is of course supplementary to the instruction given in the Lycées, which is of a high class and corresponds to that which the Royal Geographical Society has during the last ten years endeavoured to encourage in our leading public schools by their annual examinations and prize medals.

The duties of such a Professor as the Council desire to see appointed would be, first, to promote the study of scientific geography as defined above; and, secondly, to apply geographical knowledge in illustrating and completing such of the recognised University studies as require its aid.

The claims of geography to occupy a central place among the physical sciences, which already form an important part in University studies, can hardly be questioned, but, according to the modern and more liberal method of teaching in the classical and historical schools, its position in respect to these is little less essential. It may be broadly affirmed that questions are set in every examination in these schools which cannot be adequately answered without considerable knowledge of the higher geography.

It has been pointed out to us that no better proof can be given of the intimate connection between the present University studies and geography, than the list of subjects for prize essays proposed at Oxford, which is appended below.

It should be further remarked that while the facilities for travelling have widely extended, and in consequence the number of young men who travel after leaving the Universities, for the sake of supplementing their education, is increasing every year, very few of them are qualified to make an intelligent use of the information which they may or might obtain, and still fewer are qualified to make observations of the least scientific value. The same may be said, with little qualification, of the much smaller number who go out as missionaries, and who often enjoy precious opportunities of collecting new evidence, not merely on geographical questions but on questions of ethnological and philological interest. Such persons, if previously trained under an able professor at a University, would form a most valuable corps of scientific observers. An impartial comparison of the literary results of English and German travel at the present day seems to show that the educational advantages which we ask for in England, and which are attainable in Germany, have there borne their actual fruit in developing and directing the powers of observation in German travellers.

A University professor would probably so arrange his lectures as to fall in with the general course of studies at the Universities, adapting one part of them to students of history, and another to students of physical science. He would also perhaps deliver at least one annual discourse on some subject of original geographical research.

The establishment of a Professorial Chair, and the example and scholarly writings of a University professor, would give a much needed impetus to the progress of the art of teaching geography in schools, which is at present imperfectly developed, and for which the existing text-books are avowedly inadequate. It appears that of all the subjects handled by those graduates of Cambridge who hold the office of lecturers in the great provincial towns, in connection with the Cam-

bridge University Extension scheme, none has been so popular as physical geography. A supply of such lecturers, who had been well instructed by a University Professor of Geography, would therefore confer a real benefit on the education of the country, and one that would be widely appreciated.

The copious collection of maps, models, pictures, and ethnological illustrations of the various lands which are the theatres of historical study, which would gradually accumulate under the charge of a Professor of Geography, would enable him to illustrate their configuration and scenery as well as the social character of their inhabitants, with a fulness that no ordinary teacher could hope to rival. Such illustrations, it may be remarked, are consistent with the general tendency of modern instruction.

It might be thought advisable to entrust the proposed professors with some special duties in respect to the collection of geographical publications in the University libraries, so as to ensure that these stores of knowledge should be easily available in any emergency, when facts relating to some half-forgotten country are earnestly desired by the public. We may be sure that under such circumstances their comments would be awaited with interest and listened to with respect.

In conclusion, the Council would strongly urge that there is no country that can less afford to dispense with geographical knowledge than England, and that, while there is no people who have a greater natural interest in it (as shown by the large support received by the Royal Geographical Society), there are few countries in which a high order of geographical teaching is so little encouraged. The interests of England are as wide as the world. Her colonies, her commerce, her emigrations, her wars, her missionaries, and her scientific explorers bring her into contact with all parts of the globe, and it is therefore a matter of imperial importance that no reasonable means should be neglected of training her youth in sound geographical knowledge.

SUBJECTS FOR HISTORICAL PRIZE ESSAYS PROPOSED FROM TIME TO TIME AT THE UNIVERSITY OF OXFORD, MORE OR LESS GEOGRAPHICAL.

*Subjects for the Marquis of Lothian's Historical Prize Essay* (founded in 1870).

In 1872. The importance throughout modern history of the frontiers of France, Germany, and Italy. [No prize awarded.]

In 1877. The place of Iceland in the history of European institutions.

*Subjects for the Arnold Historical Essay* (founded in 1851, in memory of Dr. Arnold).

In 1851. Whence arose the greatness and the decay of the power of Carthage.

In 1853. What effects of Alexander's conquests in India are discoverable in the subsequent history of that country.

In 1855. The Roman coloniæ under the Empire.

In 1856. The Jews in Europe in the Middle Ages.

In 1859. Delphi considered locally, morally, and politically.

In 1862. The Danube, as connected with the civilization of Central Europe.

In 1867. The Mahometan power in India.

In 1869. The English colonies in America before the Declaration of Independence.

In 1870. The Scythic races of Europe and Asia, from the earliest times to the fall of the Western Empire.

In 1872. The influence of the Roman conquests on Roman literature.

*The Stanhope Historical Essay* (founded in 1856).

In 1859. The causes of the successes of the Ottoman Turks.
In 1860. The fall of the Republic of Florence.
In 1861. The rise of the Swiss Confederation.
In 1865. The rise of Russia.
In 1867. The causes of the decline of Spain.
In 1874. The Portuguese in the East.

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## B*.

### ELEMENTARY SCHOOLS.—PROGRAMME PRESCRIBED BY EDUCATION DEPARTMENT, 1885, FOR INSTRUCTION IN GEOGRAPHY.

*Standard I.*—To explain a plan of the school and playground. The four cardinal points. The meaning and use of a map.

*Standard II.*—The size and shape of the world. Geographical terms simply explained, and illustrated by reference to the map of England. Physical geography of hills and rivers.

*Standard III.*—Physical and political geography of England, with special knowledge of the district in which the school is situated.

*Standard IV.*—Physical and political geography of the British Isles, and of British North America or Australasia, with knowledge of their productions.

*Standard V.*—Geography of Europe, physical and political. Latitude and longitude. Day and night. The seasons.

*Standard VI.*—Geography of the world generally, and especially of the British colonies and dependencies. Interchange of productions. Circumstances which determine climate.

*Standard VII.*—The ocean. Currents and tides. General arrangement of the planetary system. The phases of the moon.

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## C.

### 1.

### EXAMINATION PAPER IN SIXTH FORM, UNIVERSITY COLLEGE SCHOOL, LONDON.

1. Give detailed descriptions and maps of the course of two important rivers, one in the Old World, and the other in the New (source, boundaries and area of basin, length, tributaries, scenery and physical peculiarities, towns on banks).
2. The mouth of the Danube, Lyons, Trieste, and the mouth of the Gironde are about on the same parallel of latitude (45½). Give the distances and draw a section of the country between. Name two places in Asia and two in America on the same parallel, and give their approximate distances from the mouth of the Danube.
3. News is telegraphed from London at midday; supposing it transmitted instantaneously, at what time will it reach Cairo, Sydney, Bombay, San Francisco (California)? Why does the time of day differ at these places?

4. Explain fully, why, within the Arctic Circle, there is at one time perpetual day, and at another perpetual night.
5. Describe the position of the following places, and say for what they are remarkable: Cronstadt, Syracuse, Angora, Zermatt, Ravenna, Verona, Melbourne, Jerez, Granada, Nismes, Cherbourg, Spezzia, Tangier, Ascension Island, Juan Fernandez, Ulundi, Timbuctoo, Mobile, Valparaiso, St. Louis, Servia, Cincinnati, Valentia, Gweedore, Bradford, Merv, Tiflis, Pariaput, Peshawur.
6. Describe the position of three important coalfields in the British Isles, and of three in other parts of the world.
7. Give a full account of Manitoba *or* British Columbia.
8. Describe *one* of the following islands: Madagascar, New Guinea, Borneo, or Jamaica.
9. What different land and water routes are there from Chicago to the sea?
10. Describe the Suez Canal, and any alternative routes that have been suggested from the Mediterranean to India.

2.

## ETON.—UPPER SCHOOL; BOYS ABOUT 17 YEARS OF AGE.

### Trials for First Hundred—*July*, 1879.

*Physical Geography.*

1. What is wind? How are the Trade Winds caused? Explain the occurrence of certain belts of Calms.
2. How are land and sea breezes caused? Where are they mostly met with?
3. Describe fully the Harmattan, Puna, and Mistral, giving their causes and the places where they are met with.
4. What are waterspouts? How are they formed? What are the characteristics of typhoons?
5. What are the principal causes of oceanic currents? What do we know of the temperature of the sea at great depths?
6. Describe fully the Gulf Stream. What analogy exists between aërial and oceanic currents?
7. To what causes are the tides due? What influences modify the normal movements of the tidal wave?
8. What are co-tidal lines? What are bores and how are they caused? Is it correct to say that the Mediterranean is a tideless sea?
9. What is meant by isothermal lines? Explain isothermal lines. Trace the course of the isothermal line of 50° Fahr.
10. Explain the term isobars. When do we meet with maximum barometric pressure?

### Trials for First Hundred—*July*, 1880.

*Physiography.*

1. Explain fully what is meant by magnetic declination. What is the declination at present in England?
2. What is meant by contour lines? Show how a hill may be drawn in contour. In a map drawn on the scale of 3 inches to the mile, what is the representative fraction?

3. What is meant by a river-basin? What is a catchment basin? Draw a section across the Thames basin from Aylesbury to Guildford.
4. Explain the term water-parting. How does it differ from water-shed? Give instances of each.
5. Explain fully the formation of springs. What is meant by the term "dip?" How does the dip facilitate the flow of springs?
6. What geological formations are the chief sources of the water supply of the Thames basin? How is it that water is sometimes met with at the top of a hill and not at the bottom? Give instances.
7. What are artesian wells, and why are they so called? What is meant by a "fault?" What is the effect of a fault in determining the position of a well?
8. Explain the formation of a cloud. In what condition is water supposed to exist in clouds? How are the different forms of clouds classified?
9. Explain why fogs are generally met with on the banks of Newfoundland. Why are the fogs of London so dense? How is a river fog caused?
10. Compare the rainfall of Cornwall with that of Berkshire. Give reasons for the difference. How is the rainfall measured?
11. Why are some districts rainless? Name the chief rainless districts of the earth. "Where the rainy days are fewest, the amount of rain is greatest." Explain this apparent paradox.
12. Where is the Region of Calms? Describe fully and explain the physical peculiarities of this region.
13. How is dew formed? Explain the term "dew-point." Why is dew less plentiful on a cloudy night?

## Upper Division Trials—*July*, 1881.

### ARMY CLASS.

*Physical Geography.*

1. Give an account of the principal mountain chains of Asia.
2. Explain fully the following terms, specifying the districts for which the name was originally employed:—selvas, steppes, karoo, delta, kloof, ghaut.
3. Explain the difference between a plain and a plateau. Name the chief plateaux of Africa.
4. Give a full account of the Mediterranean Sea.
5. What does the barometer indicate, and how is it therefore applied to show the height of mountains?
6. What is the "Telegraphic Plateau?" Explain the term "maximum density." What is the maximum density of salt water?
7. Explain how the tides are caused. Is the assertion that the Mediterranean is a tideless sea correct? Give a reason for your answer.
8. What influence have winds over oceanic currents? Distinguish between constant and periodical currents.
9. Why are there constant fogs off Newfoundland? What do you know about the following—Agulhas, Sargosso Sea, Dead Sea, Shamo, Turan?
10. What is the highest mountain in the world?
    Give the height of the snow-line in the Sierra Nevada.
    What is the height of Etna?
    What is the distance in miles from Sierra Leone to Brazil?
    What is the breadth of Behring's Straits?

## BOYS 13–15 YEARS, PAPERS SET TO BOYS WHO HAVE BEGUN SCIENCE.

TRIALS—*March*, 1885.

i. *For those who have been at Science one term.*

1. The *orbit* of the earth round the sun is an *ellipse*. Explain the meaning of the words in italics.
2. The earth is a *spheroid*. Explain the meaning of the term, and give various reasons for believing the earth is of this shape.
3. What is a planet? Give the names of as many as you can in order of distance from the sun.
4. State all that you know about the moon.
5. What is the circumference of the earth? Compare its size with that of the sun and moon.
6. What is the meaning of *axis, zenith, antipodes, tropics, hemisphere*?
7. Explain the inequalities in the length of the days and nights at various seasons of the year.
8. How do you account for the changes from winter to summer in the Northern Hemisphere?
9. What is meant by *Parallels* of Latitude?
   Iceland is 65° N. Latitude, Ascension lies nearly due south in 8° S. Latitude: how many miles apart are they?
10. What is meant by *Meridians*?
    Charlestown is 80° W. Longitude: what o'clock is it there when it is noon at London?
11. When does an eclipse of the sun occur?
12. What are the tides, and how are they caused?

ii. *For those who have been at Science two terms.*

1. Give fully the various proofs of the earth being hot below the surface; especially give in detail the information derived from mines.
2. Describe and name the instrument used for measuring temperature, explaining the arrangement of the degrees.
3. Explain the construction of a Mercurial Barometer, showing what it measures, and state what special use it can be put to on moving from place to place.
4. What are the components of sea-water; how may the liquid part be separated from the solid?
5. State what facts you know respecting the depth of the ocean.
6. What part of the air is most necessary to our life? How do our bodies use it and with what results?
7. How is it that the world is not gradually poisoned by carbonic acid gas being given out by animals?
8. What is condensation of aqueous vapour? What causes it?
9. Explain separately the particular cause of the formation of hoar-frost and of fog.
10. (Do *a* or *b*, not both).
    *a*. Describe the arrangement of land and sea on the surface of the Globe. Has it always been the same as it is now? Give reasons for your answer.
    *b*. What degree in the Fahrenheit thermometer corresponds to 25° C.? What degree in the Centigrade thermometer corresponds to 50° F.?

iii. *For those who have been at Science nearly a year.*

1. Explain clearly what is meant by the snow-line. Why is the snow-line often higher on some parts of a mountain chain than on others? Give examples.
2. Explain the expressions—Névé, Regelation, Bergschrund, Moraine, Roche Moutonnée.
3. How are crevasses formed and then closed up again?
4. Compare a glacier and a river—
   *a*. As regards their movement.
   *b*. As denuding agents.
   *c*. As carriers of material from higher to lower levels.
5. What are ice-bergs and ice-floes, and how are they formed?
6. What do you know about the glacial period?
7. What is a delta, and how is it formed? Why do some rivers form no deltas? Give examples.
8. Explain the terms *solution*, *suspension*, *sediment*.
9. What do you know about the formation of alluvial plains, and river terraces? Give instances of both in the neighbourhood of Windsor.
10. Do *A* or *B*, not both:—
   *A*. In what rocks do you find inland caverns? Explain their formation, and also that of the stalactites sometimes found in them.
   *B*. Distinguish between wind-waves, tidal-waves, and ocean currents; and explain what is meant by a plain of marine denudation.

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## D.

### 1.

### PROGRAMME OF THE GLASGOW ACADEMY.

Geography has always held such a high place among subjects of school study in Scotland that it is taught in the Glasgow Academy neither as *compulsory* nor *optional*, but as a matter of course. Up to the 4TH CLASS in the Advanced Course each pupil receives from his earliest entrance in school one and a half hour's instruction per week. This instruction is conveyed by the staff of English masters, whose training has virtually constituted them Science Masters, as this term is technically understood by the Science and Art Department, South Kensington. The classical masters confine themselves to classical geography, as suggested by the authors read, and the historical course under study.

A complete course of geography up to the 4th Class, Advanced Division, is virtually a course of *seven years*. It consists of three broadly-marked divisions.

I. A course of Reading Lessons on geography from books copiously illustrated, so as to show pictorially the meaning of geographical terms, with interesting chapters on the geography of the British Isles and Ireland. This course is taken up by Classes I., II. and III. Preparatory course as in the accompanying prospectus.

II. The general geography of the great division of the globe, with map-drawing. Classes I. and II. Advanced course.

III. Detailed geography of the British Isles and Ireland, with the detailed geography of the Colonies, with map-drawing. In this course the connection between the historical and geographical curricula, always kept in *view*, becomes prominent. Classes III. and IV. Advanced course.

After this stage classical students devote their attention to classical geography as mentioned above, but the V. and VI. Modern continue their geographical studies according to the following course:—

V. Modern. A very detailed study of Europe with special reference to—

(1.) The physical features and climate.

(2.) The commercial geography resulting.

(3.) The present political and social condition viewed as a result of its entire previous history. The connection between this course and the parallel historical one is evident at every step.

VI. Modern. The great migrations of the European peoples, with historical map of Europe and the British Isles, or, as it were, the fossil geography of these countries.

The text-books used by the pupils may be gathered from the prospectus, but it may be said of all professed geographies purchasable that, while the worst of them are simply rival catalogues to the Post Office Directory, the best of them still approach too near to this traditional standard.

As to the apparatus used, that is only of the ordinary kind—maps, globes, &c., as there is nothing else purchasable. Even in the domain of maps, the V. and VI. classes suffer greatly, as there are absolutely no maps published for such studies, and they have to be gathered from, now this historical manual, now that, or compiled laboriously by the teacher for black-board or chart.

The seventh question as asked betrays a most despondent conception on the part of the interrogant as to the state of the geographical teaching in Britain. So much does the question fall below the level of the actual facts to be elicited that, but for its earnest and naïve sincerity, a Scotch teacher—any intelligent teacher, indeed, for such may be found in England also—would be inclined to resent it. The position, however, in the Glasgow Academy is this: Geography as taught anywhere, and when taught at the best, must always entail a very considerable effort of memory—indeed, unless, perhaps, systematic botany, there is no science entails an effort so considerable. But it is never forgotten in the academy that geography is a *science*, though one of imperfect *data*; and so far as geological and cosmical laws determine physical feature and climate, and these again determine natural productions, mineral, vegetable and animal, to give rise in turn to certain lines of commerce, social life and political circumstance, when taken into conjunction with the fact of humanity —so far, indeed, as geography betrays a logical connection, and is subject to reason and prediction—such connection is kept in view. It is never allowed to become a mere effort of memory. So far from its rising once in a while, and by chance as it were to the stage of a discipline, the ability of the teacher never allows it to fall below that stage.

2.

## DULWICH COLLEGE.—PROGRAMME IN GEOGRAPHY.

THE JUNIOR SCHOOL (Form Masters).

All are taught about the form and motions of the earth, meaning of latitude and longitude, &c., and in addition,—

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|---|---|
| 1*st Form* .. .. .. | Outlines of World. |
| 2*nd Form* .. .. .. | 1st Term—Asia and Australasia. |
| | 2nd Term—Africa and America. |
| | 3rd Term—Europe. |
| 3*rd Form* .. .. .. | 1st Term—England and Wales. |
| | 2nd Term—Scotland and Ireland. |
| | 3rd Term—British Possessions. |

In Senior School boys are not compelled to learn geography. A few take it as a Special from choice, and not many of these beyond two years; in fact, only a few remain more than one year.

*1st year* .. .. Mr. Robinson goes over Geikie's 'Outlines.'
*2nd year* .. .. Mr. Robinson specialises, using as his programme that of Royal Geographical Society for Medals.

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## E.

### OPINIONS OF HEAD-MASTERS OF ENGLISH PUBLIC SCHOOLS AS TO THE VALUE OF GEOGRAPHY AND THE POSITION IT OUGHT TO HAVE IN SCHOOLS AND UNIVERSITIES.

"Not sufficiently important as an educational instrument, except in very skilful hands, to claim much time in the limited time-table. Consequently, cut out by the pressure of other subjects. Occasional *lectures* at public schools by thoroughly qualified lecturers would do much good in stimulating interest in the subject, and such lectures would be warmly welcomed by head-masters."

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"Adds considerably to the interest of the work generally, but can hardly say it is a discipline."

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"Much more could be done if boys were well grounded before they come to us."

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"So great deficiency of good material that all teaching must suffer."

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"I regard geography as an important subject, both as an instrument of culture and as a preparation for commercial life."

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"Every effort to make the subject an intellectual discipline, and it is so made, but in different degrees by different masters. Problems are set arising out of the geography or history lesson; *e.g.* (1) Given a place in the tropics and the relative positions of mountains and ocean, investigate the climate. (2) Why are Bordeaux or Cairo where they are? (3) Why does Namur figure so constantly in certain wars? (4) The Spanish Peninsula as a battle-ground. Where, *à priori*, would you expect the battle-fields in a particular campaign to be?

"I think that geography can be made an extremely valuable and interesting educational instrument; and there is scope for it in 'Modern' schools; but it is not made the most of at present, even there; and *Examining Bodies* might do much more than they do at present to ensure that the subject shall be used as an intellectual discipline. *University* Examiners are quite in the dark as to the capabilities of this subject; *e.g.* Oxford Local Examinations (Juniors), July, 1884, Q. 8: 'What are the chief religions of the world, and how are they distributed?' This is not 'geography,' but pure unmitigated 'cram.'"

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"Geography (as taught) is little more than effort of memory; I regard it as quite worthless educationally (till it becomes a branch of history). I have no doubt that if taught by thoroughly instructed masters, with sufficient time allowed, physical geography at least might be made interesting and educationally valuable,

like any other branch of human knowledge; but the one thing that is quite clear about schools at present, is that the curriculum is monstrously over-crowded with subjects already, and I look with horror on any possible increase."

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"Political geography is so far a matter of memory. Our only problems in it are time problems for longitude, and tracing lines from place to place as described above. The map-drawing is very valuable training for the eye and hand. They learn how to look at an object so as to recollect distinctly the form, instead of getting a hazy impression of it. So also with regard to rivers and mountains, boys are usually satisfied with a general impression that the course is say N.W. or thereabouts, and it is only when they come to put their impressions on paper that they find out how exceedingly inaccurate they were.

"The result of my experience is that what we suffer from most is the entire absence of suitable maps and text-books. The one object of almost all maps and books is to get as many facts as possible into the space. The object should be to put in the minimum. Topography, which is the foundation of geography, is simply a matter for the eye. At present a map of England in our school atlases is a bewildering mass of detail which no reasonable being would attempt to master. There should be nothing there which an intelligent boy might not be expected to reproduce with accuracy. After our younger boys had become thoroughly familiar with the great features by frequently copying these from properly prepared maps, I should proceed to make them, in the higher forms, reproduce these from memory on a blank sheet of paper. This would be quite easy work, as I know by experience from what we can do when our boys come to the subject quite fresh. Here we should require text-books. Nearly all our present ones are quite useless; they are miniature gazetteers. We want full descriptions of the countries, productions, animals, plants, with as many illustrations as possible; and, as before, just a few big towns, and a good account of the natives and government and trade. I think these would be best issued in separate small volumes. For the highest forms still more elaborate text-books might be issued, including a fairly elaborate sketch of the history of each country—a subject of which our English boys grow up in hopeless ignorance. The main point is that there should be nothing in the maps or books which the boys should not be expected to remember for life. In the highest form boys could learn to draw from memory some rather larger maps—as that of central Europe in Faunthorpe.

"One very great difficulty in teaching geography is the presence of new boys or promoted boys in a form. We cannot assume any knowledge on the part of the whole form, and have to begin afresh every term. It is hard to see how this difficulty is to be met, for if the boys were arranged in sets according to their geographical knowledge, a new boy high up would be working with quite little boys, and the work would be too easy for him, unless indeed all preparatory schools adopted the same system, which I think the public schools might force them to do. For the highest forms physical geology would come in admirably, alternating with other special subjects.

"I should like to make the geology of the district a part of the regular course, but form masters can't all be expected to teach it; with sets it would be easy and extremely valuable."

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"The usefulness of political geography for many careers is indisputable; but the subject is of enormous extent, and demands minute knowledge of innumerable facts, so that in practical life men are content to learn such parts of it as directly concern their business or profession. My experience shows me that such knowledge can be

very rapidly and easily acquired by those whose faculties have been trained by the ordinary method of a liberal education.

"I should consider it a grave mistake to occupy much of a boy's time in cramming his memory with geographical facts at a stage of his education when his faculties can be much better trained and developed by other processes.

"We have now and then had boys who, from special circumstances or aptitudes, have turned to geography with special interest. In such cases we have thought it right to give them special facilities; and in a few cases they have presented themselves with success at the examination of the Royal Geographical Society."

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"The subject is merely an effort of memory. We cannot make a discipline of it, nor set problems in it. Geography is, more than any subject, even than any other *special* subject, the business of none but a specialist, who should be a travelled enthusiast. Even if he has not travelled much, a man who has the subject thoroughly at heart may do a great deal with it. But even then there will be only few boys who will respond to his teaching. The successes of Liverpool and Dulwich Colleges show how efficient the work of an individual enthusiast—I use the word in admiration—can be. As a *compulsory* subject in public schools, and taught—as it must be under those conditions—by a number of assistants who have no special interest in the work, and cannot clothe the dry bones, it must fail. As an *optional* subject, with a competent teacher, good results might be obtained; but a great portion of time would have to be deducted from other work.

"I believe that at the colleges above mentioned the geography class give up a great deal. In fact, now that it is not a subject favoured by competitive examinations, it becomes almost a study *de luxe*—few can spare from subjects more necessary the time required."

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"The general weakness of geography in public schools may, in my opinion, be attributed to three causes:

"1. The general apathy of the public on the subject.

"2. The dreariness of the subject as at present taught.

"3. The incompetence of ordinary teachers, who have derived their knowledge from text-books, and therefore fail to make the subject interesting to their pupils.

"*E.g.* The description of a country by a traveller who has been there, supplemented with the exhibition of specimens, photographs, anecdotes, would do much to relieve the dulness of an ordinary lesson. This is quite beyond the reach of ordinary masters.

"Could travelling professors or lecturers visit schools, each lecturing only on what he has seen?"

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"Physical Geography properly taught I take to be an excellent discipline, and one which may be made to yield the same kind of benefit as is derivable from intelligent study of the other subjects more commonly regarded as sciences, to which it frequently serves as an introduction; and for further acquaintance with which it commonly begets a desire—subsidiary results, which in the case of boys on the modern side, whose school days are limited, cannot but be regarded as highly valuable.

"I have a belief that the importance of the subject is very generally underestimated, and that even when the subject appears on the time-tables it not unfrequently has to give place to other subjects in which masters take greater interest or which they are better qualified to teach—a state of things University recognition would go far to do away with."

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"For ourselves I can say that our zeal does not need to be stimulated, though I am sure we have much to learn as to the best methods of teaching. But our great difficulty is the competition of other subjects to which the public as yet attach greater importance."

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"I think it would be more helpful if the Geographical Society gave us some information. If the inspectorship of education were organised more like an Educational Department, and arrangements made for good lecturers being sent down, and loans of special apparatus made for purposes of geographical teaching, I believe a good deal of good might be done in this way. We have nearly enough inspecting and 'pulling up the roots' in these days."

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"I should say that geography is rather a stimulus than a discipline, as it is taught here—*i.e.* it excites intellectual curiosity rather than trains the reasoning faculty. But this does not seem to me necessarily disparagement of the subject.

"I use several German atlases, and have an impression that the condition of our English atlases, as also of our school maps, is enough to show that the subject of geography requires further support and stimulus from the leaders of the nation. So far as I know, there is no really satisfactory school map of our own Empire or of India. The former I have had done by means of *German* atlases for our use."

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"Geography should be taught by a specialist; that is, either by an English or by a science master trained for the purpose at a seminary for high-school masters after he has taken his degree at some University. Geography should be recognised as a science in the Universities, but this will not be done so long as they are allowed to exist solely as an exploiting-ground for a few fortunate private individuals."

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"It deserves a great deal more attention than it is understood to receive in English schools; and a geographical lectureship might very advantageously be established in every British University."

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"My personal views are that after a fair knowledge of the more important points in political geography, and a reasonable grasp of physical geography, the subject is best not pushed into minutiæ. The thing to be aimed at is not to become a walking atlas, but to know how to use maps and atlases when required."

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"I think the subject of geography is much neglected. There is also a great want of text-books suitable to the teaching of geography. Some are a mere mass of names; others are too comprehensive for the early stages they profess to deal with. I should like to see more books, at say one shilling, giving full account of a single country or continent. Some encouragement might be given by grants from societies to schools. But care should be taken not to encourage cram. There is need too of a systematic code, so to speak, drawn up by practical men, showing what should be learned in geography from say five years of age to eighteen. A lectureship on geography in University would be desirable.

"Local natural history and natural products museums might be more common. These show what products are found in foreign countries. They generally require great improvement in the way of classification."

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"As far as my own experience goes, boys at public schools in England are, generally speaking, lamentably ignorant of geography. I regret this extremely, and

wish it were possible to give more time to the subject among the many which nowadays claim a portion of our boys' time. A great deal more, I am convinced, ought to be and might well be done to give boys a taste for geography and a fair knowledge of geographical facts before they come to a public school at all.

"I think we should do well to set apart a special time in each year, or each term, for the study of geography. It would be in my judgment a more economical and a far more effective way of teaching the subject than by trying to get one or two geographical hours sideways, week by week, into our overburdened curriculum."

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"The teaching of geography in schools must be very largely, if not entirely, regulated by the requirements of the various public examining bodies."

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"I feel strongly the great importance of the subject, not only as a mental discipline and essential part of a liberal education, but as more especially necessary for Englishmen, many of whom will be called upon in after life to turn their geographical knowledge to practical and serious account.

"The difficulty in doing justice to the claims of this subject consist in:—

"1. The vast pressure of all kinds of subjects, which makes it difficult to find time for teaching, and a vacant spot in the boy's brain for receiving a subject that does not 'pay' in those examinations for which the school more immediately prepares. Hence I direct that more time shall be given to geography on the modern side—not because I think it more important, or so important, for a business man as for a Member of Parliament or a professional man—but simply because where Greek is not taught and Latin is reduced, we have so many more hours free to give to a very desirable subject.

"2. The great scarcity of specially qualified masters. This subject not being required for the usual degrees at the Universities, few of the young masters at public schools know very much about it, beyond the general stock of information supposed to be necessary for a scholar and a gentleman.

"3. The somewhat absurd prejudice against teaching geography, as if it was less worthy of a first-rate man than Latin prose or essay-writing or criticism. This prejudice is dying away, but is still felt as a sort of back current: and I have known able men, fresh from Oxford and Cambridge, who fretted at having this subject entrusted to them. It is connected, no doubt, with the old-fashioned mechanical conception of geography, now I trust vanishing into the limbo of exploded fallacies. I think the most needful innovation will be to introduce at all good schools a special geography master, if possible an Oxford or Cambridge man, but, if not, a man who shall be really first-rate in his subject and shall be able to treat it in the broadest and most philosophical manner, while at the same time he would not forget the needs of examinations. It is possible that schools which had not large revenues might hesitate before diverting a considerable sum annually to a subject from which a visible return in the shape of examination results might not be easily secured: but large institutions might surely do so with advantage; and representations might be made to some of the chief examining bodies to induce them to make geography more often a compulsory subject than it is. I understand geography in the liberal sense, *i.e.* as including not only so-called physical and political geography, but also the distribution of animals and plants, the elements of the science of the earth's crust, and the physical history of man; such a subject, if intelligently taught and intelligently tested, would bring out as well as perhaps any other could do the intelligence and imagination of boys; and I for one should be glad to see it made compulsory in the University certificate examination, and in the Previous at Cambridge and Responsions at Oxford.

"There is a great danger at the present day of educational systems oscillating between two extremes, the exclusively abstract and literary, and the exclusively concrete and scientific. Now geography understood in its ideal sense strikes a mean between these. It is sufficiently imaginative and varied to stimulate the more delicate minds, and deals with realities sufficiently concrete to satisfy those who look to science as the best engine for developing our higher faculties. I think to make it merely subservient to or illustrative of history, is a mistake. It can stand by itself as a branch of thought and knowledge perhaps hardly less important even than history itself.

"As to boys liking it, there is no fear about that. Given a teacher who is himself an enthusiast, I believe that no subject (except perhaps mathematics) would excite keener interest. I have taught the lowest class on a not very clever modern side both political and physical geography for more than a year, and I can speak from experience in saying that while the political geography was often well learnt, and fairly remembered at the terminal examination, the physical was eagerly studied, and brought out unexpected enthusiasm in some of what were thought the stupidest and laziest boys.

"I think the present inquiry by the Geographical Inspector may be productive of great good, if the idea is once set on foot that geography is a worthy subject for the ablest masters to teach and the ablest boys to work at, and especially—considering the competition existing among schools—if some definite suggestions are made to the chief examining bodies to give greater prominence to the outlines of this subject in all their preliminary or qualifying examinations."

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"The drawback which geography in schools suffers from to a great extent is the unsatisfactory method of examination. The examinations of the Royal Geographical Society are so high in their standard that a boy would have to devote almost his entire time in geography if he wished to have much chance of success. The examination of ordinary examiners from the Universities is unsatisfactory, because it is generally founded on the old idea of geography—that it is only a few strings of names and facts learnt by heart. For instance, I have sometimes requested that the boys should be asked to draw a map of a country on blank paper. The result of this has generally been estimated by the examiner according to its pictorial success, and the real points of merit, such as accuracy of coast-line, proportion of distances, and description of surface and drainage, disregarded. My own view is that the 'picture' of the Globe should first be learnt thoroughly by means of maps, pencils, and paper. Then that the methods of measuring and projecting the Globe should be taught, and after that the historical, physical, and political geography of the continents and oceans, and of the individual countries thoroughly mastered. The worst way of all is to learn a page or so of a geography book with only a few dry facts."

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"The action of the Royal Geographical Society in offering medals to be competed for annually by the boys of our public schools has given a decided impetus to the teaching of geography in some, perhaps in most of those institutions. It was and is impossible to give much time to the subject—say an hour and a half a week—hence, many teachers *were* satisfied with a general knowledge of the leading facts, such as the capitals of countries, the chief rivers, mountains, &c. It was entirely a matter of memory, and gradually became monotonous to both teacher and pupil. But the efforts of the Royal Geographical Society resulted in showing that it was possible to make it a good mental discipline, to set very interesting problems, to awaken thought, excite interest, and cultivate the faculty of observation. So much attention

was given to the subject that the competition for the medals became very keen, and it soon became useless to send up candidates who had not strong geographical proclivities, and a sound knowledge of geography. The Royal Geographical Society is, therefore, to be congratulated on the success of its efforts. However, the Society has lately resolved to discontinue—only for a time it is to be hoped—the offer of medals, and consequently the annual examination. Meanwhile there is plenty of good work to be done. Under its auspices a sound, and the same time readable and enjoyable, text-book might be produced—also a complete set of apparatus and appliances to illustrate and explain the astronomical relations of the earth, its form, size, motions, relative position, &c., with all the resulting phenomena, the natural forces which act on it, with the effects produced. In addition, wall-maps on as large a scale as possible, with a view to convenience, might be supplied under the direction of the Society. The microscopic view of a country obtained from small maps gives but a poor idea of the distance to be travelled, or physical difficulties to be encountered in crossing the country. If this were done the schools would soon be on a more equal footing, and certainly a real or thorough knowledge of the science would be much more general than it is at present. The programme of the Society was well arranged and very suggestive, but there ought not to be any distinction between physical and political geography. Purely political geography belongs to the domain of history. Geography should be regarded as a complete description of the earth as it was handed to us by nature, and as it has been and still is influenced by the natural forces which never cease to act on it—in fact, a description of the earth just as it is. The subject is by no means a dull one, it is eminently an experimental science.

"Geography, like charity, ought to begin at home. Before venturing abroad it is necessary to have some notion of the cardinal points, and the simplest methods of obtaining latitude and longitude. Mere definitions are of little use."

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## F.

### 1.

### HARROW SCHOOL.—GENERAL PAPER SET FOR LADY STRANGFORD'S GEOGRAPHY PRIZE. (No Date.)

(1) Explain Mercator's projection and equal surface projections, and discuss the advantages and disadvantages of each.

(2) On Midsummer Day at midnight how high is the sun in the sky (in degrees) at the North Pole? How far below the horizon at Harrow, and in what point of the compass? Show how you obtain your answers.

(3) George Stephenson said, "I think my engine goes somehow by bottled sun-rays." Explain this fully. Do you go by bottled sun-rays?—if so, how? What other sources of energy are there?

(4) What are the general facts about the distribution of hot and cold water through the ocean depths? Why is the bottom temperature of the Mediterranean no lower than the average winter temperature of its surface? What sort of motions do you connect with these facts, and how? Will they account for the great ocean currents?—if not, what will, and how?

(5) What should be the length of a water barometer (density of mercury being roughly 12)? Why cannot you have as long a barometer as you like by increasing the surface at the open end?

(6) Contributions of Darwin to our knowledge of Physical Geography.

(7) Compare names of rivers and mountains in different European countries, and account for their similarity.

(8) Write a short history of Spain from the names of places in it, and mention all the names of places in the world you can think of derived from Julius or Augustus Cæsar or any other Roman Emperor.

(9) Derive the following names, discuss the principles of the derivations, and add any stories you can think of—Santiago, Mount Erebus, Atlantic, Detroit, Europe, Amazon, Franz Joseph Land, Wales, Servia, Sutherland, Lorraine, Bungay, Dauphiné, Negropont, Siberia, Tuilleries, Kaffir, Montreal, Nablûs.

(10) General Kaufmann is just dead. Draw a map of the Oxus and Jaxartes basins, showing the positions of the principal khanates subjugated by Russia during the last thirty years. Discuss the position of Merv. What river is it on?

(11) Draw Worcestershire and all the counties which touch it, marking the rivers and principal towns.

(12) Draw the course of the St. Gothard Railway from Lucerne to Milan, marking the principal rivers, making the map wide enough to include Turin and Brescia.

(13) Where are the following rivers? Into what sea or river do they flow? Any one town on any of them; any historical fact in connection with any of them—Tarim, Lot, Wharfe, Lualaba, Pisuerga, Mekong, Armançon, Bagradas, Canadian River, Sakaria, Guadalete, Arta, Pará, Jalon, Glommen, Mulde, Rion.

(14) All you know of the following: exact position, history, &c.:—Merida, Popocatepetl, Machachi, Dapsang, Pilmo, Ghuzni, Lassa, Banjaluka, Goa, Krasnovodsk, Kairwan, Kazan, the Chots, Demavend, Kara, Kioto, Pisheen, Ilimanni, Schebulos, Cuzco, Crivoscia, Zara, Lagos, Aquileia, Naas, Cairngorm, Bucsecs, Tödi.

(15) Principal places (1) on the Equator, (2) on the Meridian of Greenwich round the world.

(16) Highest peaks in the Bernese Alps, Altai, Caucasus, Karakoram, Islands in the S. Atlantic and Gulf of Guinea. Volcanoes far from the sea. Underground rivers. Centres of highest negro civilisation. Loftiest freshwater lakes. Towns most shrunk from early greatness. Towns once harbours, from which sea has retreated. Rivers which have changed their course.

(17) Draw a line to represent the Equator, and place roughly in their proper position with respect to it and to each other, the Society Islands, the Sandwich Islands, the Marquesas, the Ladrones, the Fiji Islands, the Friendly Islands, the Philippines, the Carolines, the Galapagos, and New Caledonia.

(18) Draw a Chinaman, the Great Bear, and a yak. Where and why do you find Arctic plants in Southern Europe? What kind of fauna and flora would you expect to find (1) in an island a long way from a continent; (2) in an island near a continent? If your expectations were not fulfilled, how would you explain it?

2.

## ETON.—NATURAL SCIENCE PRIZE, 1883.

*Physical Geography.*

(1) What is the intimate structure of *Ice*? and by what means would you demonstrate this structure?

(2) Explain the origin of a *River-delta*. Name one in Europe, Asia, Africa, and America respectively.
(3) Name the chief rainless regions of the Globe. Give a reason for their existence. By what name is the science of "Rain-*ology*" known?
(4) What is hoar-frost? How is it produced?
(5) Account for the relative saltness of certain inland seas. What is the mean specific gravity of sea-water? What is known concerning the colour of the ocean?
(6) Enumerate the botanical areas into which it is usual to divide the earth's surface.
(7) Why does a little spirit (*i.e.* spirits of wine) or ether, when sprinkled on the hand, produce a sensation of cold? Which of the two produces the greater degree of cold?
(8) Describe the origin and progress of a glacier.
(9) What are the composition and some of the properties of the atmosphere?
(10) What is known in geography by the term *Stratum of Life*? How far have the hitherto accepted views, so far as the sea is concerned, been modified by the recent researches of the 'Challenger,' and other kindred expeditions?
(11) Define the terms *Perihelion* and *Aphelion*. In which of these positions (*i.e.* whether at perihelion or aphelion) does the earth receive the greatest amount of heat, and why?
(12) What are the causes of waves? How are tides produced?

## NATURAL SCIENCE PRIZES, 1884.

### *Physiography.*—I.

(1) Explain, by the aid of a diagram, the cause of the seasons.
(2) How has the size of the earth been determined?
(3) Explain the law which governs the density of the atmosphere at different heights above the earth's surface.
(4) Why does ice usually form on the surface of water, and under what circumstances may ice be formed at the bottom of a piece of water?
(5) How is "rainfall" measured? Give a drawing and description of the instruments used.
(6) Explain the fact that dew is not formed during a cloudy or a windy night.
(7) What are cyclones and anticyclones? State the law which expresses the relation between the direction of the wind and the distribution of atmospheric pressure.
(8) What facts do you know concerning the distribution of temperature in the deeper parts of the ocean?
(9) Describe the action of plants and animals, respectively, upon the constituents of the atmosphere.
(10) Describe the changes in the flora which you would expect to find in ascending a very high mountain in the Equatorial region of the globe.

3.

## SUBJECTS FOR GEOGRAPHY PRIZE AT RUGBY.

1875. Williams' 'Middle Kingdom.' Hughes' 'Treasury of Geography: China.'
1876. Burton's 'Ultima Thule,' i.
1877. Burnaby's 'Ride to Khiva.'

1878. Bryce's 'Transcaucasia and Ararat.'
1879. Rae's 'The Country of the Moors.' Gibbon's 'Roman Empire,' c. 51.
1880. Dennis's 'Cities and Cemeteries of Etruria,' i. Smith's 'Dictionary *Italia*.'
1881. Wallace's 'Australasia,' c. xiii.–xxvii.
1882. „ „ c. i.–xiii.
1883. Keane's 'Asia.'
1884. Lansdell's 'Through Siberia.'
1885. Wallace's 'Australasia,' c. xiii.–xxvii.

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## F*.

## UNIVERSITIES LOCAL EXAMINATIONS.

### 1.

OXFORD.—Report of the Examiners in Geography, 1884.

*Seniors.*—"The work done this year was of a very satisfactory character. Care and accuracy were the distinguishing features of the greater part of the answers. It is evident that the teaching of geography is of a very sound description.

"The answers to the questions on physical geography were perhaps the most creditable, and the questions in that section of the paper were usually answered well.

"The maps were far from good. The knowledge of the position of the places mentioned was usually of the vaguest description.

"This very serious defect, together with failure to answer satisfactorily the questions on political and commercial geography, prevented several candidates from obtaining a high place.

"But having made these exceptions, I am glad to say that the general average was a high one, and the accurate knowledge shown most praiseworthy."

*Juniors.*—"The general standard of geographical knowledge appears to be rising; especially there is greater accuracy in map-drawing: many sketch-maps of Scotland were very creditably drawn. The outline maps were more frequently fairly filled in than when I examined last.

"Precision has not been obtained in the use of geographical terms, such as 'watershed' and 'cañon.'

"The assigning the habitat of various products far too generally depended more on the feeling of what countries ought to produce than on what they actually do."

### 2.

OXFORD, Senior Candidates, 1884.—Paper set in Physical Political, and Commercial Geography.

[N.B. Candidates are expected to answer one question *at least* from each section of this paper.]

Section I.

1. In the accompanying map of India (1) trace the course of the Indus, marking its tributaries; (2) trace the ranges of the Eastern and Western Ghauts mark with an asterisk the position of:—Gwalior, Benares, Poon

Ahmedabad, Assye, Tinnevelly, Lahore, and in every case insert the names.

2. Which are the mountainous parts of Great Britain? How has their existence affected the history of the country?
3. Explain the terms—trade-winds, fringe-reefs, mistral, cirrus, geyser.
4. Draw a sketch map, either of the Rhone, marking its tributaries and the chief towns on its banks, *or* of Wales, marking the counties and chief towns.

SECTION II.

1. Enumerate the states and races comprised in the Austro-Hungarian monarchy. Give their geographical position and general characteristics.
2. Give a concise account of the conquest of Canada by the English, and explain why they have retained their hold on that country.
3. Describe the position and importance of the Soudan, Tonquin, Holstein, Manitoba, Basutoland.
4. What do you know of the constitution of Japan, India, Peru, Sweden, Switzerland? Explain the importance of the neutrality of Switzerland.

SECTION III.

1. From what countries are the following commodities exported—petroleum, jute, quicksilver, indigo, currants, barley?
2. Follow the course of the principal trade routes between Northern and Southern Europe during the Middle Ages.
3. To what circumstances do the following towns owe their importance—Alexandria, Dortmund, Spezia, Sunderland, Galle?
4. What are the principal products of Ceylon, Zanzibar, Peru, European Russia, New Zealand?

3.

OXFORD.—GEOGRAPHY PAPER SET TO SENIOR CANDIDATES, 1884.

1. Explain the terms—the Khamsin, delta, littoral, cañon, prairie, selva, sierra, pampa, estuary, tornado.
2. Where are situated Mount Hooker, the desert of Atacama, Lake Tanganyika, Dingle Bay, Brescançon, Carlsruhe, Cintra, Khatmandu, and the Valdai Hills?
3. From what countries and from what kinds of plants do we obtain gutta-percha, ebony, tobacco, cork, cotton, teak, help, sago and arrowroot?
4. What do you mean by the vertical distribution of plants? Give examples of plants so distributed.
5. Give the chief tributaries of the Amazon and of the Obi. Illustrate by sketch maps.
6. In the accompanying map of North America—(1) draw the ranges of the Sierra Nevada, Rocky Mountains and Alleghanies; (2) trace the course of the Mississippi and its feeders, the Makenzie, the St. Lawrence, the Peace River, and the Saskatchewan; (3) mark with an asterisk the position of New York, Toronto, Quebec, San Francisco, New Orleans, St. Louis, Charleston, and Chicago; and in every case insert the names.
7. Describe the chief coal-fields of England, and show how they have affected the distribution of the population.
8. Draw a sketch map of Scotland, and insert the principal mountains, rivers and towns.
9. What are the chief religions of the world, and how are they distributed?

4.

CAMBRIDGE.—Report of the Examiners in Geography (in English Section), 1884.

*Juniors.*—"The work was done fairly well, better on the whole than last year. A large proportion of the outline maps were correctly filled in. The answers in physical geography were however generally unsatisfactory: the candidates appeared in very many instances to have learned by heart the answers to specific questions; while the character of the errors committed in reproducing these answers showed that their meaning had often been entirely misunderstood. The questions dealing with the British Empire were generally well done, the more general questions not so well. On the whole there was an improvement in general intelligence.

*Seniors.*—"The work sent up in answer to the earlier questions was, as a rule, good and satisfactory, and a distinct improvement on that of last year. The definitions of latitude and longitude were, with a very few exceptions, not sufficiently precise or scientific, but the latitude and longitude of the places named were given with accuracy by a large number of the candidates. The map of India was well drawn by the majority, and shewed that much time and attention had been bestowed on the study of that Dependency. In addition to the mountains, rivers, and political divisions, a large number of cities were also inserted in many cases. The subject of rainfall distribution had evidently been generally a favourite one, and very many candidates answered the question bearing on it fully and well; but whilst the general principles were clearly understood and satisfactorily explained, there was frequently want of thought in applying those principles to the explanation of local variations."

5.

CAMBRIDGE.—Report of Examiners on Physical Geography as a Science Subject.

*Seniors.*—"The answers in physical geography were far from satisfactory. Those who obtained distinction and about nine others appeared to understand their subject, and here and there a single answer showed in a few thoroughness and completeness, but the majority appeared to have learned some facts and sometimes reasons by rote, and showed no attempt to think out anything for themselves or even to assimilate processes of reasoning from books. There was in most cases complete ignorance of the meaning of sections and contour-lines. Here and in other questions the more plentiful use of diagrams would have been very advantageous.

"On the whole the candidates showed a tendency to accumulate quantities of facts rather than to obtain a few carefully selected examples and thence argue to general laws."

6.

CAMBRIDGE.—Geography Paper set to Junior Candidates, 1884.

*Every answer, which admits of it, should be given in tabular form.*

*The answers to questions marked* A, B, *are to be arranged and sent up to the Examiner in two separate bundles.*

A 1. In the accompanying Map mark the courses of the Douro, Ebro, Guadalquiver, Tagus; Sierra Estrella, Sierra Morena, Sierra Nevada; and the following places, and no others: Alicante, Bilbao, Cadiz, Corunna, Lisbon, Oporto, Oviedo, Saragossa, Toledo.

A 2. Explain the terms, *atoll, cyclone, ecliptic, meridian, monsoon, moraine, table land.* When does the sun shine vertically (1) on the tropic of Cancer; (2) on the tropic of Capricorn? By what names are these times known?

A 3. Name four towns on the Ganges and four on the Rhine. What is meant by the *right* bank of a river?

A 4. Name in order the chief capes on the east coast of England and Scotland between Dover and Aberdeen, and the counties in which they are situated.

A 5. A person sets free seven carrier pigeons at Limerick to go to Belfast, Cork, Kildare, Kilkenny, Killarney, Tipperary and Waterford respectively. Draw seven lines from one point to show clearly the directions which would be taken by birds flying straight from Limerick to these towns. Write the name of the town against the line in each case. Which bird would have the longest, which the shortest distance to fly?

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B 1. What is the general character of the coast of the Baltic? Name in order, following the coast line, its principal seaports, stating in each case the country to which it belongs and the chief articles of export.

B 2. Name the provinces which form the Dominion of Canada. What is the nature of the connection between the Dominion and the British Crown?

B 3. In which of the Australian Colonies respectively are Adelaide, Ballarat, Bathurst, Brisbane, Geelong, Melbourne, Newcastle, Paramatta, Perth, Sydney?

B 4. With what industries are the following places specially connected, and where are they situated: Burslem, Creuzot, Crewe, Droitwich, Lyons, Mobile, Monte Video, Odessa, Paisley, Rangoon?

B 5. Name in order the countries and seas through which the line of the Equator passes.

7.

CAMBRIDGE.—Paper set to Senior Candidates in English Section. Physical, Political and Commercial Geography.

*All answers to questions marked* A *to be fastened together in one bundle. All answers to questions marked* B *to be fastened together in another bundle.*

A.

A 1. Define Latitude and Longitude. State approximately the latitude of St. Petersburg, Rome, Trinidad, Mauritius, and Melbourne (Australia), and the longitude of Mecca, Havre, Colombo, Figi Islands, and Hamburg.

A 2. Draw a map of India showing the principal mountains and rivers, the most important towns, and the political divisions, distinguishing in the latter case those which are under British and native governments respectively.

A 3. State what you know about the distribution of rainfall in Great Britain, and account for any remarkable instances of local excess or defect as compared with the average for the whole country.

A 4. Describe briefly the Landes of France, the Geysers of Iceland, the Dunes of Holland, the Glaciers of Switzerland, and the Steppes of Russia.

A 5. Mention in order from source to mouth the principal towns on the banks of the Elbe, and any circumstances of interest connected with each. Illustrate your answer by a map.

B.

B 1. What is included in the term "British North America"? Draw a sketch map indicating the chief rivers, lakes, and mountains of that country, and mention five sources of its natural wealth.

B 2. "The sea and the land wage perpetual warfare wherever they come into contact with each other." In what parts of England in historic times has each achieved remarkable results?

B 3. Specify the principal winds and currents which a ship would encounter in making a voyage from London to Ceylon round the Cape of Good Hope; explain the cause of each.

B 4. The routes to the greater dependencies of Great Britain are guarded by chains of lesser dependencies. Show this to be the case with respect to India, and state shortly when and under what circumstances each lesser dependency you mention was acquired.

B 5. Enumerate the British Colonies and settlements in Oceania; and state the chief articles exported and imported by each. Give some account of the native races and indigenous animals of these countries.

8.

CAMBRIDGE.—Paper on Physical Geography as a Science Subject for Senior Students. Physical Geography.

1. Explain the mode of formation of Rain, Mist, and Dew.
2. Draw roughly a map with contour-lines of an island with two mountain peaks, one near the northern, the other near the southern extremity; and having one river running into the sea on the east, and two on the west side; also draw a section across the island from north to south.
3. Discuss the explanations which have been given to account for the circulation of oceanic waters.
4. Describe the characters of the principal deposits now being formed by diatoms, foraminifers, and corals.
5. What important physiographical events have occurred at the following places since Roman times: Rossberg, Krakatoa, Reculvers, Adria, the west coast of the Baltic?
6. Write a short description of the mode of origin of mountain chains.
7. Give some account of the phenomena attendant upon a severe earthquake, and describe the method used for fixing its point of origin.
8. Distinguish clearly between the *habitat* of an organism, and its *range*. Mention the habitats of some common English plants and animals.

9.

OXFORD AND CAMBRIDGE SCHOOL EXAMINATIONS, 1884.

Physical Geography and Geology.

1. One bank or valley slope of a winding river is usually steeper than the other. Draw a diagram illustrating this point, and explain how the difference in the slopes is caused. What arrangement of strata is necessary for the production of a waterfall in a river's course?
2. Write a short account of the action of the sea as a destructive agent, and state what physical features result from a continuance of marine denudation.

3. In what respects does sandstone differ from quartzite, shale from schist, and granite from gneiss? Give some explanation of the difference in each case.
4. What reasons are there for believing that a source of heat exists in the interior of the earth?
5. Mention the characters which would satisfy you that a deposit had been formed (1) in shallow water, (2) in fresh water, (3) in a lake.
6. Describe briefly the succession of deposits in the Jurassic Series of the West of England. Are any peculiarities in the character of these beds exhibited in Yorkshire?
   Mention any substances of economic value derived from these deposits.
7. What was the condition of England during the glacial period, and what indications and relics of that condition are still to be found in this country.
8. Name the specimens A, B, C, D, giving the characters by which you identify each.

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## F**.

### 1.

OXFORD.—Communication from the Rev. H. F. Tozer.

"I am a warm advocate of the more definite recognition of geography in our University examinations and courses of study; but, though I am loth to say anything that may tend to discourage, I am afraid I do not see much prospect of it. I think the establishment of a Professorship or Readership in the subject would be a good thing, as a definite recognition of the subject, and as providing the University with a man who should represent that branch of knowledge; and any representation made by the Royal Geographical Society would, I doubt not, be respectfully listened to. But Professorships and Readerships do not make classes of students; and the studies of the undergraduates are almost entirely regulated by the examinations. Into these geography enters only as subsidiary to history, and even in connection with ancient and modern history the attention that is paid to it is slight. This ought not to be so, but the change cannot be brought about by legislation. One course of lectures in one College, I think, on the subject of modern historical geography, has been given during one Term in the past year; but that is all. Again, the establishment of Scholarships or prizes to encourage the study might do something, but the influence would be limited to the few who would compete for them. In fact, I do not see how geography is to be introduced into our system so as to influence the Public Schools, because, like many other valuable subjects, it is crowded out of our examination schools by other subjects which the University at large is not disposed to give up. But for my own part, I should be sincerely glad to see a change made in this direction."

### 2.

GEOGRAPHY AT CAMBRIDGE UNIVERSITY.—Communication from the Rev. Coutts Trotter.

"With respect to the recognition of geography by the Universities it is difficult to give a definite answer. No doubt every educated man ought to have a fair elementary knowledge of geography, but he ought to acquire this before he leaves

school. There are many other things which every educated man ought to know; but it is not, I think, the business of the University to find out whether he knows them all or not. Pass examinations are evils in themselves, and ought not to be multiplied without urgent necessity.

"With respect to the more advanced or detailed study of geography, such as might conceivedly be carried on at the University, I do not clearly understand what the Council of the Society understand by it. Of course physical geography comes in to a considerable extent as a part of geology, and in connection with the distribution of animal and vegetable life, and the like. History cannot be properly studied without historical geography, and in one way or another a good deal of geography is bound up with more than one subject of degree examination.

"I have not, however, any very clear ideas of what the study of geography, as a separate subject, would mean, or what would be the nature of the lectures of a professor or reader in geography, and without such ideas I am unable to express any opinion as to whether it would or would not be desirable to establish such a post. It would no doubt be convenient to have some one to whom it would be possible to refer any geographical problem which might turn up, and the solution of which could not be found in the ordinarily accessible sources of information; but I must confess that the minute study of the geography of regions in which one has not for the time being any other special interest, seems to me to be both uninteresting and unprofitable to most men. When my attention is called in any way to a particular region, I get up as much about its geography as I may require for my purpose, and find reasonably accessible; but I cannot fancy myself sitting down to devote some months or years to the minute study of geography in general.

"I should like to learn more definitely what the Council of the Society understand by the recognition of geography by the University, and what is their idea of the functions of a reader or professor of the subject. It is right, however, to say that the funds of the University will not in all probability admit of much being done in the way of establishing new posts in the immediate future.

"There is one way in which the University might no doubt promote the study of Geography, viz. by adding to the collection of maps in the University Library, and improving their arrangement. I believe that this will be done before long."

3.

CAMBRIDGE.—Communication from Professor G. H. Darwin, F.R.S.

"Geography is not, as far as I am aware, taught as such in the University, nor are there any rewards for proficiency. The only way in which it enters into the curriculum is as a subordinate branch in a great many subjects. Whilst I am of opinion that too little weight is probably attached here to geography, I am disposed to think that this subdivision is the best way in which the University can recognise geography.

"In the present condition of agricultural depression and of sweeping modifications of our system entailing heavy new charges, I think it will be difficult to extract an adequate salary from the University for a competent professor of geography.

"Geography should certainly be represented either conjointly with other subjects or by itself; but if the teacher takes geography as his principal subject it appears to me that it is one which demands, more than most others, a man of first-class ability. In the hands of a mediocre man it would almost certainly degenerate into a descriptive catalogue, and would be of no educational value. On the other hand, a really accomplished man might make it an important branch of one of the several categories enumerated in B. (Memorandum of Instructions, II. B., p. 5 of Report.)

If such a man were to present himself in any of these branches, I think it possible or even probable that the University would find a post for him.

"I cannot see how geography pure and simple can be made a subject of intellectual training, and I think the University will hesitate to give it a prominent part in their degree examinations.

"As I have already said, in other words, geography appears to me at once wide and narrow. A department of geography occupies part of the same field as meteorology, but it is likely that a knowledge of the actual distribution of water on the earth's surface would follow the study of physics rather than precede it. However, meteorology is still so much in its beginnings that it is no use discussing it with regard to University teaching.

"Again, terrestrial magnetism is attached to the theory magnetism and follows the study of that theory. Geodesy follows this theory of the earth's figure and astronomy, and surveying is a branch of the art of the Civil Engineer,—and so on through other branches of physics.

"Similarly there are other categories attached to Natural History, Geology, Politics, History, and Political Economy.

"It is impossible for me to say how far the several teachers in these branches touch on geography.

"In expressing these opinions it must be borne in mind that I have not paid attention to the subject myself, excepting incidentally to other studies."

*3a.*

I reproduce the following letter from Professor ALFRED NEWTON, F.R.S., to the late Mr. Rye, taken from Mr. D. Freshfield's 'Memorandum on the Proposals in Substitution for the "Public Schools Prizes."' The motion referred to was the following:—

"It is desirable to appoint lecturers in geography from time to time to deliver courses, wherever the Council may direct, and on the appointment of the first such lecturers, to communicate with the Vice-Chancellors of Oxford and Cambridge, with the object of entering into arrangements for the delivery of lectures by the Society's lecturers, or other qualified persons, at and under the authority of the Universities, and in connection with their studies."

*February* 21*st*, 1884.

"MY DEAR RYE,—I have shown the copy of Mr. Freshfield's motion to several influential men here, including some members of the Council of the Senate, and they agree with me in thinking that any proposal based on such terms, made to the University by the Royal Geographical Society, would be sure to receive the most respectful attention, and would probably be, after due consideration, favourably accepted—*i.e.* the University would most likely afford a geographical professor appointed by the Society every facility for delivering a course or courses of lectures in one of the University buildings.

"I may here mention that on the 6th of February last year the Special Board for Biology and Geology suggested that 'Geography' was one of the subjects in which 'University teachers should be eventually appointed' ('Cambridge University Reporter,' 13th June, 1883, p. 885), and I have good reason to think that the same Board would support any well-considered scheme for giving effect to this suggestion.

"Whether the proposed lectures, if given, would be successful or not is more than I can predict. So much would depend on the lecturer himself; but for my own part I should be very glad to see the experiment tried.

"I may here remark that the 'Geography' contemplated in the suggestion (above quoted) of the Special Board for Biology and Geology was, of course, *physical* geography. If the subject of the proposed lectures were *political* geography, it would rather seem to come under the cognisance of the Special Board for History and I am quite unable to say what view might be taken of it.

"It would therefore be well that in case any communication be made by the Society to the Vice-Chancellor, the subjects to be dealt with by the lecturer should be precisely stated, in order to preclude the possibility of the proposal being referred to the wrong Special Board; for I presume that the Vice-Chancellor and Council of the Senate would not come to any conclusion without such a special reference.

"You will, of course, understand that in this letter I do not pretend to pledge the University or anybody in it to what I have said or to any course of action. I only propose to give the impression left on me after speaking to men of more or less weight in University matters as to probabilities.

"Believe me to be, yours very truly,

"ALFRED NEWTON."

CAMBRIDGE.—LETTER FROM PROF. A. NEWTON, F.R.S., TO MR. KELTIE.

"Magdalene College, *June 3rd*, 1885.

"We are neither better nor worse than others in regard to the prevailing ignorance of geography that characterises most Englishmen who are supposed to be highly educated; but perhaps there is manifested in Cambridge a greater indifference to the value of the study than elsewhere, which may partly be accounted for by the zeal with which other branches of learning are prosecuted, and the fact that so many students of Natural Science are careless of the encouragement of any but the particular subject in which they are personally interested. Moreover, I have met with not a few people who are unable to understand that geography is a study to be followed for its own sake.

"You are of course aware that there is no instruction in geography worthy of the name given in the University, and I may add that I find some difficulty in rendering my lectures on the Geographical Distribution of Animals intelligible owing to the great ignorance of general geography displayed by many of my hearers."

4.

CAMBRIDGE.—COMMUNICATION FROM PROFESSOR MCKENNY HUGHES, F.R.S.

"I have received your letter and enclosure respecting the teaching of geography in this University, and shall be glad to bring the matter before the special Board of Studies which are now considering the addition of new subjects to those already recognised in the Natural Science Tripos. It seems to me that geography must be taught in several departments, but especially in that of geology, where we now give much time to the parts included under the terms Physical Geography, Physiography, Dynamical Geology, &c., &c.

"When we have got our Economical Geology museums and classes into working order, another large branch, viz., Commercial Geography, will be included.

"Political and Historical geography should be taught under the tuition of the Board of Historical Studies, before which I will take an opportunity of laying your proposals."

5.

## CAMBRIDGE.—EXTRACT FROM SYLLABUS OF THE GEOLOGICAL CHAIR.—Prof. McKenny Hughes, F.R.S.

### Geological Physics.

A.—*Physiography.*

(i) *The Atmosphere.* Composition: presence of aqueous vapour: conditions which determine the condensation of this aqueous vapour into dew, mist, cloud, rain, or snow. Distribution of rainfall. Physical properties of air; weight, the barometer.

Origin of winds. Cyclonic character of storms. Laws of direction and force of the wind in cyclones and anticyclones. Weather charts. Systems of winds over the earth's surface.

(ii) *The Ocean.* Recent soundings. Configuration of sea-bed. Mean depth of ocean and mean height of land. Conclusion indicated by this, of greater permanence and antiquity of oceanic features.

Deposits of sea-bed. Globigerina ooze, diatom ooze, red clay and radiolarian ooze. Origin of each. Coral reefs and islands. Theories of their formation. Sea water; its composition. The ocean as the great receptacle of the salts dissolved by terrestrial waters from the rocks.

Movements of the oceanic waters. Surface currents and bottom "creep." Temperature observations and bearing on oceanic circulation. Discussion of causes of these phenomena.

(iii) *The Atmosphere and the Ocean in relation to Temperature,* i.e. *Climate.* Mode of propagation of heat. Pure dry air diathermanous. Aqueous vapour athermanous, hence importance of aqueous vapour in the atmosphere from climatic point of view. Latent heat and specific heat, and their bearing on climate. Heating effect of sun's rays dependent on latitude and altitude. Mechanical equivalent of heat and estimation in its mechanical equivalent of the heat conveyed by aerial and oceanic currents from tropical to temperate and polar regions, and the modification of climate thus produced by geographical causes.

C.—*Structural Geology.*

I. Stratification, joints, inclination of rocks, curvature, cleavage, dislocation, unconformability.

Petrological features of igneous rocks, *i.e.* mode of occurrence in crust of earth. Contact alteration. Metamorphism of rocks.

II. *Origin of Scenic features.*

(i) *Valleys. Caves.* Proofs that they are in the main due to denudation. Variation in shape of valleys dependent upon relative importance of weathering, erosion, and transportation. Longitudinal and transverse valleys. Breaching of hill ranges by valleys.

(ii) *Fjords.*

(iii) *Lakes.* Two groups (*a*) those formed by barriers, (*b*) those in true rock basins. Discussion of theories of origin of rock basins. Faunas of certain lakes and their bearing upon theories of origin.

(iv) *Plains.*

(v) *Escarpments.*

(vi) *Mountains.* Those due to (*a*) accumulation, volcanoes. Old denuded volcanoes, Arthur's Seat, Mull, &c. (*b*) Circumdenudation. (c) Disturbance. Distinction between the forces that gave position to the ranges, and those which have imparted external form. Thickness of strata in great mountain ranges. Crushing and folding of the rocks. Types of flexure. Overfolds and overfaults.

D.—*Palæontological Geology.*

Distribution of plants and animals over earth's surface. Conditions of entombment of organic remains. Their preservation. Laws of distribution applicable to past "succession of types." Doctrine of colonies.

6.

OWENS COLLEGE.—Communication from Prof. Boyd Dawkins, F.R.S.

"The deplorable ignorance of geography among all classes in this country, in my opinion, is largely due to the bad teaching in the elementary and secondary schools. At present geography is taught either from the physical side, i.e. mountains, rivers, glaciers, seas, &c., without any relation to the ancient history of the earth, or from the historical side as a part of history. These two points of view are kept as far as possible apart. Geography should be taught, it seems to me, as a part of earth history, and on that foundation the various sections, historical, political, commercial and descriptive, *à la* Humboldt, might be developed as may be wished.

"We are stirring in Manchester in our new geographical society, and had organised a committee very much on your lines. We shall now await the result of your inquiry.

"In Owens College we have just organised a joint set of geographical lectures, beginning with the physical history of Britain, and ending with the development of British commerce, and of the colonies.

"Geography is taught in our regular course, in Owens College and in the Victoria University by me, under the head of physiography (see enclosed syllabus), and by Professor Ward from the historical end of the stick. Our courses, however, are not connected or continuous, as they should be. We are feeling our way towards a more systematic teaching.

"With regard to Professorships in Geography the practical difficulty will be to find men who can grasp all the sides of the subject—physical, historical, commercial, descriptive. I, for instance, could take the first, but my knowledge of the spread of British commerce in Eastern Asia or of the development of the colonies of Greece would be bookish and perfunctory. The only way of meeting this difficulty seems to me to organise joint courses of lectures by different Professors, each master of his subject.

"I enclose a letter (see below), from Professor Ward (History). If I can do anything to help the movement, I will do it."

7.

EXTRACT FROM SYLLABUS OF LECTURES IN PHYSIOGRAPHY, GEOLOGY AND PALÆONTOLOGY, AT OWENS COLLEGE, MANCHESTER—Prof. Boyd Dawkins, F.R.S.

*Physiography.*—1. The Agents at work on and beneath the Surface of the Earth.

(*a*) The action of water.—Rain and its work.—Torrents and rivers and their work.—The sea and its work; its temperature and its currents.

(*b*) Frost, snow, and ice.—Glaciers and icebergs and their work.

(*c*) The atmosphere; its temperature and its currents.

(*d*) Chemical action in building up and destroying.—The work of carbonic acid.—The formation of caves and ravines in calcareous strata.

(*e*) Organic action.—The work done by plants and animals.—The secretion of carbonate of lime, silica, and carbon in their tissues.

(*f*) The phenomena resulting from earth-heat.—Volcanoes and their work.—Earthquakes and their work.—Elevation and depression of land without the intervention of earthquakes.—Folds and contortions.

(*g*) Mountain-making and valley carving.

(*h*) Hot-springs and their work.

2. The distribution of land.

3. The distribution of the Mammalia and their evidences as to changes in Geography.

4. The distribution of Man, and his advance in culture.

5. The Earth in relation to the heavenly bodies.

6. The Ancient History of the Earth.

Text-books.—Huxley, 'Physiography'; Geikie, 'Physical Geography'; Lyell, 'Principles of Geology.'

Books of reference.—Angus Smith, 'Air and Rain'; Tyndall, 'Lectures on Heat'; Somerville, 'Physical Geography'; Wallace, 'Geographical Distribution'; Wallace, 'Island Life'; Murray, 'Geographical Distribution of the Mammalia'; Wyville Thompson, 'Depths of the Sea': Tyler, 'Anthropology'; Lockyer, 'Astronomy'; Dawkins, 'Early Man in Britain.'

8.

LETTER FROM PROFESSOR WARD (HISTORY) TO PROFESSOR BOYD DAWKINS.

"DEAR DAWKINS.—In reply to your query I may say that all our history examinations (in both University and College) take into account the political geography of the periods to which they relate; and in our junior examinations, as again in our highest or Honours examinations, we make a special point of it. Professor Bryce, who has hitherto acted as our external examiner for the University, is entirely agreed as to the expediency of this.

"As to the teaching, we try to give a fair amount of historical geography in a large junior English History class, and in our Ancient History classes. How much of it enters into our more special courses depends on their subjects, which vary. For some years we had at the College a special geography prize for the study of a special geographical subject; but it was only a temporary foundation.

"As you know, we are now contemplating the establishment of geography courses in our evening classes, which will of course include courses in political geography. This must, from the nature of the case, be an experiment, but it may guide us towards systematising our geography instruction in the day classes at some future time.

"Yours ever,

"A. W. WARD.

"Prof. W. Boyd Dawkins, F.R.S."

9.

LONDON UNIVERSITY.—GEOGRAPHY PAPER FOR MATRICULATION.

1. What is your notion of the extent and the boundaries of the region called South Africa?

2. Define Latitude and Longitude. What is meant by the Antarctic Circle?

3. Which are the most widely wooded districts in England? State anything you know concerning the extent of the great English forests in earlier times.

4. What counties in Great Britain and Ireland are at this day mainly inhabited by a Celtic population?

5. Of what States are the following towns the capitals:—Stuttgart, Quito, Bankok, Bucharest, Teheran, Lima, the Hague?

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## G.

## "INSTRUCTION" AS TO THE SCOPE AND METHOD OF STUDIES TO BE OBSERVED AT THE KRIEGS-AKADEMIE, BERLIN.

(*a*) *General Geography.*—While, by the appointment of a series of lectures on military geography, provision has been made for the particular requirements of geographical study with a view to special culture in the science of war, it must appear indispensable to secure in the syllabus of the Kriegs-Akademie the means likewise for completing a knowledge of general geography, and for appreciating the reciprocity obtaining between the physical constitution of countries on one hand, and the development of their peoples and States on the other.

The circle of sciences, comprehended generally under the name of geography, forms the transition and concatenating link between the natural and historical sciences, at all these points, namely, which refer immediately to the character of the earth's surface as the arena of the development of mankind.

The course of lectures on general geography will, therefore, have to describe the different divisions of the earth according to their characteristic forms by nature and their several configurations of climatic zones and regions; as also the human race according to their natural and intellectual relations and ramifications, their mode of life, their states of culture, their social and political conditions; the geographical distribution of the human species, and their ramifications; the divisions of the earth according to their groups and systems of peoples; and, finally, the organisations founded by the various peoples and conditioned by the soils and characters respectively of their arenas of development—namely, the States, and, by consequence, the formation of the present system of States and their fundamental powers. The geographical course of study at this stage, namely, that of the appreciation of political States, conducts the student into historical science.

A systematic scientific conception of geography will take the whole earth's surface as the subject of its comparative studies, and all the more when at the present time European culture is pressing forward on every hand with rapid progress. In consideration, however, of the historical task devolving on Europe, to become the representative and leader of this world-wide culture, the student in his historico-geographical studies will specially apply his mind to the appreciation of the physical configuration of Europe, and how it exercised such influence on its inhabitants as to qualify them for such a mission.

For this course four lectures per week in the first Cötus are appointed, the attendance at which is "faculative."

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## G*.

### 1.

OXFORD.—Honour School of Modern History.—Geography.

1. How long did the following territories exist, and of what constituent parts were they composed—the kingdom of Provence, the Duchy of Guienne, the Duchy of Burgundy (as held by Charles the Bold)?
2. In what sense can the Rhine be called the natural frontier of France, and when was it also the political frontier?
3. What races make up the population of modern France, and how far do these races still occupy distinct districts?
4. State the territories contained in the Prussian kingdom under Frederick I., and show how they had been brought together.
5. Illustrate, from any one district of England, the help of a physical map in determining the time and place of the Anglian or the Saxon settlements.
6. How far are the physical divisions of Italy brought out in *either* of these two: (1) the division of states at the entry of Charles VIII., *or* (2) the reconstruction by Napoleon?
7. Illustrate briefly these statements: (1) "Africa begins at the Pyrenees;" (2) "Spain is made for defensive warfare;" (3) "The greatness of Spain, being factitious, was her ruin."
8. Where are any of the following places, and what is their geographical and historical importance: Bremen, Goslar, Guesen, Nocera, Este, Citeaux, Manzikert, Edessa, Ascalon, Montenegro, Belgrade, Pultowa, Taxhen, Kainardji, Arcola?
9. "In the Eastern Empire hardly a province was lost till it had been once or twice won back." Exemplify this from any cases within your period.
10. Explain the geographical obstacles to an invasion of India from the north-west. How has the advance of the British power during the present century altered the conditions of the problem?
11. The region from the Scheldt to the Sambre is the arena which nature seems to have prepared for France and its foes to settle their quarrels there. Justify this from the history of some one campaign.
12. How far do purely geographical considerations account for (1) the migration of the ship-building trade from London about 1860; (2) the importance of the Manchester Ship Canal?
13. In what respects have the geographical characteristics and environment of Persia caused it to play in Asia a part analogous to that of Poland in Europe?

Trinity Term, 1884. (Three hours allowed.)

### 2.

OXFORD.—Second Public Examination. Pass School.
Group B.—Geography.

1. What do you know of the Panama Canal, San Francisco, Novgorod, Rangoon, Strasburg, Turin, Lisbon, Smyrna, Delhi?
2. Describe the situation and capabilities of *either* Manitoba, *or* Natal, *or* Queensland.
3. Over what parts of the earth is English now the dominant language?

4. Describe the physical features and the chief towns of *either* Spain *or* the Austrian Empire.
5. What light does the history of your period throw on the relative strength of mountain-chains and rivers as frontiers?
6. What districts have been won or lost in the last fifty years by France, Russia, Turkey; and what has been in each case the excuse for the change?
7. What portions of modern France were not included in it in the 11th and 12th centuries?
8. Explain the meaning of Pentapolis, Palatinate, Two Sicilies, Castile, Frankish Kingdom of Jerusalem; and name the chief towns in each.
9. What is the importance in your period of (1) Nocera, Este, Parma, Benevento, Citeaux, Bouvines, Zæra, Meloria, Clarendon, Rockingham; (2) the Valtelline, Belgrade, Yuste, Zutphen, Utrecht, Donauwörth?
10. In what respects do political fail to correspond with physical boundaries in the case of *either* of Hindostan *or* the Turkish Empire?
11. Show how geographical conditions help to explain the Norman conquest of Southern Italy and Sicily.
12. Show how geographical conditions help to explain the formation of the United Provinces of the Netherlands in the 16th and 17th centuries.

Michaelmas Term, 1883.

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## H.

### ROYAL MILITARY COLLEGE, SANDHURST.

FURTHER EXAMINATION.

### GENERAL AND PHYSICAL GEOGRAPHY AND GEOLOGY.

*Extra marks will be given for neatly-drawn maps and diagrams, but only so far as they are accurate.*

1. Mark on the accompanying map of New Zealand the provinces, principal rivers, mountains, and chief towns.
2. Draw a map of Ireland. Indicate upon it the principal lines of water-parting and the courses of the main rivers. Mark also the positions of eight of the chief towns.
3. Describe the boundaries of the Austrian Empire, pointing out especially the places of greatest importance in the event of war with Italy, Germany, or Russia. What races are under the dominion of Austria?
4. Enumerate the more important islands of the East Indian Archipelago, and give some account of their climate, physical features, and natural productions.
5. Write a brief account of oceanic currents and their causes.
6. Explain the construction of an ordinary barometer. Why does a falling barometer usually indicate the approach of stormy weather?
7. Give an account of the distribution of active volcanoes over the earth's surface. Are there any traces of extinct volcanoes in Britain?
8. What are the rocks of which the central portions of great mountain ranges are composed? At what period or periods were the Alps upheaved, and what was the nature of the force which produced the upheaval?

9. Give some account of a river as a denuding agent. How does a river widen its valley?
10. Draw diagrams illustrating an escarpment, a volcanic cone, a fault, an outlier, and an unconformability.
11. Write out a table of British Jurassic deposits. Place opposite each subdivision the names of one or two characteristic fossils.
12. Describe the geological features of some district with which you are personally familiar.

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## I.

### H.M.S. 'BRITANNIA.'

*December*, 1884.

### PHYSICAL GEOGRAPHY.—First Term.

Time allowed, two hours.

1. What are the generally accepted proofs of the earth's sphericity?
2. What reason can you advance for assuming that the apparent rotation of the sun and stars round the earth is due to the actual revolution of the earth round its axis?
3. What angle does the earth's axis make with the plane of its orbit?
   Explain, with diagrams, the meaning of the words:—Equinox, Solstice, and Tropic.
4. What do you understand by the term "Oblate Spheroid"?
   How much greater is the earth's mean equatorial diameter than its polar diameter?
5. Into how many Zones is the earth divided, what are the names of them, and over how many degrees of latitude do they respectively extend?
6. Explain why it is colder at the top of a mountain that at its base.
7. Give a description of the bed of the ocean, and state roughly the average and greatest depths of the different oceans.
8. With the assistance of a diagram, explain the causes of the tides.
9. Give a description of the Antarctic current, and point out its effect on the climate of South America.
10. What do you mean by *land* and *sea breezes*, and to what are they due?

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## I*.

### Science and Art Examinations; Physiography.—Extract from the Report of Professor Judd and Mr. Norman Lockyer for 1883.

"There has been a marked increase in the number of candidates who have presented themselves in this subject at the examination of the present year. The total number of worked papers was 5,687, while last year it only amounted to 4,871. This increase is exhibited in each stage of the examination, the Elementary papers having risen from 4,252 to 4,922, the Advanced from 551 to 653, and the Honours from 68 to 112.

"Unfortunately this increase in numbers is not attended with an improvement in the results. It is true that the proportion of passes in the Advanced stage has increased by 1 per cent., and of first classes by 10 per cent. of the whole number; out against this we must set the fact that in the Elementary stage the proportion of failures has risen from 41 to 45 per cent., while the proportion of first classes has declined by about 6 per cent. of the whole number of papers. The Honours papers are neither better nor worse than those of last year.

"In 1878 and 1880 a similar sudden increase in the number of papers was attended with a like decline in the quality of the work done, as illustrated by the results of the examination, and it is probable that in all cases the explanation is the same, namely, that a number of inexperienced teachers have taken up the teaching of the subject for the first time, and the low standard of their results has had a marked effect in bringing down the average of the whole examination.

"The percentage of candidates whose papers have been cancelled for want of attention to the rules printed conspicuously at the head of the examination paper is still very large. Many candidates do not attempt the compulsory questions, and some select their questions from those set for different stages. More than 5 per cent. of the Elementary papers and nearly 4½ per cent. of the Advanced had to be cancelled on these grounds. . . .

"But to teach by rote cut-and-dried answers to questions set in previous years is perfectly childish and worse than useless. It is not in the least likely (though at the same time it is not absolutely impossible) that the same question will be repeated in identical terms, and the chance of such a thing occurring is surely not worth the risk involved in such a proceeding as we describe. Leaving out of account the dishonesty of this mode of teaching, it may be condemned because it does not and never can answer.

"The extent to which this attempted circumventing of examiners is carried may be judged by the fact that some candidates write out a number of answers, which have evidently been learnt by rote, to questions set in former years, these answers having no relation whatever to the questions actually standing upon the paper. . . .

"The most glaring defect in the teaching of Physiography at the present time appears to be in the failure of the teachers to ground their pupils in the great fundamental principles which underlie the whole subject. In many cases it is too evident that the teachers have not fully grasped these principles themselves, and in others it is plain that they have actually made false and misleading statements to their pupils.

"There is proof of a complete reliance upon and slavish adherence to the statements of text-books, which would seem in many cases to be simply read to the pupils without explanation or illustration. Even the precaution of writing technical terms upon the blackboard seems to be frequently omitted, in many schools all such terms being written phonetically.

"The best and most reliable text-books are of course of little value in the hands of a careless or incompetent teacher, but in some cases teachers have unnecessarily handicapped themselves by employing very bad or altogether obsolete sources of information.

"The want of proper instruction in the great fundamental truths of Physiography is illustrated this year by the fact that more than 23 per cent. of the candidates in the Elementary stage and 15 in the Advanced stage have had their papers cancelled for gross ignorance of the subjects referred to in the compulsory questions. When it is added that no paper has been thus cancelled unless absolute ignorance was shown on the subject treated in *at least two* of these compulsory questions, the low standard of the teaching will become sufficiently apparent."

With regard to the Training College examinations in Physiography, Prof. Judd and Mr. Norman Lockyer report as follows:—

"The number of candidates in this subject has increased from 872, the number in 1882, to 1,054, the number in the present year. Up to the year 1881 every increase in the number of candidates was attended by a falling off in the character of the results. Last year the results, in spite of a considerable increase of numbers, were quite on a par with those of the preceding year. This year a still greater increase in numbers has been attended with a positive and very marked improvement in the results. The percentage of failures has fallen from 31·5 to 25·5. The percentage of Second-class passes has risen from 56 to 62, while that of First-class passes is almost stationary."

"There is still abundant evidence that the whole of the scientific teaching in some of the Colleges is carried on by means of text-books, and that the pupils are never allowed to see, and much less to perform, experiments for themselves."

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## K.

## HEIMATSKUNDE.—EXTRACT FROM THE DIRECTIONS AS TO GEOGRAPHICAL TEACHING FROM THE 'INSTRUCTIONEN FÜR DEN UNTERRICHT AN DEN GYMNASIEN IN OESTERREICH.' VIENNA, 1884.

INTRODUCTION.—*The Elements of Geography.*

Geography views the earth as a whole and the things on the earth's surface as such, in their topographical arrangements and in the relations connected with topography. The wealth, however, of matter included within this compass renders it no easy task on the part of the geographical instructor to communicate an adequate conception of it, and all the more that but a small portion, the immediate neighbourhood, lies open to the observation and personal experience of the pupils. The neighbourhood, then, must serve as a measure and standard of comparison for the distant, offering as it does an image of the same arrangement and the same relations. Geographical study and teaching, on the other hand, by comparing the neighbourhood with, and showing its relations to, other terrestrial regions, throws a new light on and imparts a new conception of the neighbourhood.

For these reasons it seems proper to begin geographical teaching with the *elements* composing the immediate landscape and forming the elements likewise of geography. The distinguishing and arranging of them will be a type of the business of the whole course of geographical instruction, and will so far determine the character of the whole. Let the pupils as far as possible set asunder and group for themselves in their own way the objects lying within the view presented to them from the top of the near hill or mountain; the first group will be formed by mountains, hills, valleys, plains: consequently level and unlevel land. Another group will comprise spring (source), river-channel, brook, stream, river, pool, pond (or, as may be, lake, sea), marsh, canal: consequently running and standing waters. A third group would cover the vegetation of the neighbourhood,—pasture-land, bush, forest (of pine and green wood), then the different cultivated species of plants. A fourth group would take in the inhabited places, and a fifth the ways of communication. Another great division would embrace the firmament, the heavenly luminaries; another the air and wind with the different sorts of precipitations. Next would come the periods of the day, and seasons of the year. This work of singling out and

enumerating would likewise give occasion to the pupils for recollecting what they had previously learned in the primary school.

*Orientation.*—Geography arranges the objects of its contemplation not only after their kind, but views them primarily and specially after their *topographical arrangement*, and its first task in that respect is *orientation*.

We arrange the features of the neighbourhood we survey, say, from a mountain, according to their succession around the horizon, according to their greater or less distance, according to their situation on this or that side, to the right or to the left of the river, and so on. In the course of this process the teacher will find repeated occasion to demonstrate to the pupils the necessity of a *universally valid orientation*, according to the sun and its daily course, whence the cardinal points of the world are taken. The clear representation of this daily course of the sun over our horizon must by practice be firmly fixed in the minds of the pupils, seeing it is the basis not only of all orientation and topographical arrangement, but likewise of mathematical geography (meridians and parallels). From the very beginning, therefore, the solar illumination of the different sides of a house, a street, a square, at different hours of the day, may be observed and fixed in the mind. In viewing a range of mountains their directions will give occasion to compare the illumination of the slopes on the two sides in the different periods of the day.

The pupil, while arranging according to the cardinal points the objects lying within his view, will also learn to arrange in this order the places remote from him, stretching out his hand in the direction in which they lie.

*Measuring.*—Another means by which the pupil learns to dispose of things and their relations is that of measurement. Exercises for this end are best fitted to awaken and sustain the interest of the pupils, and train them in making comparisons and representations of what they see. After they have determined the places according to their cardinal points, let the pupils at once proceed to measure by steps the schoolroom, the street, the market-place, in order to lay down a plan of it. The units of measure formerly in use, taken from the human body, the foot, nail, fathom, &c., with their multiples, have had to give place to measures taken from the earth itself, the *meter* and its thousand multiple, the *kilometer*. Another terrestrial unit of measure, the application of which for all larger terrestrial areas cannot be too much commended, is formed by the degree of a great circle of the terrestrial globe, the *degree of the earth*. This unit may be immediately taken from the middle meridian of any map. Its small numbers are easily kept in the memory; they show the relation to the magnitude of the whole earth, and are readily converted into kilometers.

The magnitudes of the visible neighbourhood will be made the unit or basis for the representation of magnitudes in the distance; the extent of the town in length and breadth, the breadth of the valley, of the plain, the length and breadth of the river, the area of the surface of a lake, the heights of mountains, the altitudes of particular points. Distances according to the visibility of the objects (such a place in the horizon is visible; such a place in a remote country is so many times that distance).

Another unit of measure within the personal experience of the pupils, and which is therefore all the more intelligible, is *time-measurement*. The reduction of distances (as given according to the standards of the map, for example) into so many days' journey of a pedestrian, of a caravan, or so many days' course of a river, so many days' transit of a railway train, so many steamboat passages by lakes and seas; the measurement of the course of a river by the time it takes to complete that course—by such familiar standards are distances most easily and vividly measured by the pupils.

Above all, however, the practice of *ocular measurement* awakens the interest of the pupils and sharpens their sense for taking magnitudes in space, whether they apply this mode of measurement to the spaces in the neighbourhood, or compare and determine distances and areas on the map.

Later on regions will be compared from maps of different scales, and, especially in the case of extensive remote areas, comparison will be made with European areas. In exercises of this kind it will be advantageous to place alongside the map of a foreign land the outline of the home country on the same scale.

*Plan of the Dwelling-place, Map of the Environs.*—After the first lesson in orientation and measurement, a little explanation may be introduced regarding *reduced scale* in view of map-representation. As the map is taken from nature there should be brought before the eyes of the pupils a plan of the schoolroom, with step-measurement and orientation. A quite simple plan will next be given of the school-place, on which only the most important streets and the most prominent points will be marked. The enlargement of the sketch beyond the dwelling-place will help to pave the way to a right understanding of the relations between map and reality, seeing an immediate comparison is here afforded between the two.

1. *Comprehension of the Remote.*—Comparison with the immediate neighbourhood. If the map and the reading of it is to lead to a representation of the things beyond the circle of actual vision, then will the visible neighbourhood, which at the outset supplied us with the elements of geography, and gave occasion to the most important exercises of orientation and mensuration, likewise furnish us with these new themes: scale or proportion and visual representation (*Anschauung*). Scale, as in the way above indicated, and, in addition, for the *fall* and *swiftness* of running water, &c.; visual perception (*Anschauung*) of the form of rivers, their banks, channel of the current, erosion, flooding, of the form of mountains, the stratification of rocks, of the soil, of the characteristic distribution of woods and other forms of the vegetable covering, of cultivation, of the situation and character of inhabited places, of the architecture of the houses, of the density of population, of the course of winds and its connection with the weather, of the character of the seasons in comparison with that of the different zones of latitude, as also of the high regions and many other points of relation. Above all, however, the conceptions of mathematical geography must be linked immediately to the visual perception of the solar course over our horizon and to the representation of the position of the rest of the earth and its lands in relation to our horizon.

Altogether it is advisable to refer as often as possible for purposes of comparison to the immediate neighbourhood, and all the more so that in our fatherland the landscape is in most parts so richly and variously furnished. Where these advantages are wanting, *miniature pictures* will yet be found in abundance for comparison; and the brook with its windings and floods and variously shaped banks, the dale with its contrasting sunny and shady side, the swollen stream after a downpour of rain, presenting in miniature the beautifully executed picture of a river; slopes of earth with their river-like veins, with their furrowed upper edges, the imitation of mountain crests, such as may also be observed on a melting snow mass in spring.

*Instruction in the open air* is not so easily carried out with a whole class, but readily with a few pupils, who will then give account in the class of the observations and exercises they have made outside. For some purposes, such as the introduction to the study of the heavens, such instruction is hardly to be dispensed with, though it should comprise only a few lessons. In other respects it is enough if the teacher stimulate the pupils in the school to observation and stir up the memory of what they have observed out of it.

2. *Landscape Pictures.*—The production and hanging up of landscape views or of

plans and drawings, whether they be wall-pictures or smaller pictures in glass and frame, will be one of the best means to bring home to the pupils ideas of distant places and vitalise for them the view of the map, so that they may see in it more than mere signs. Instead however of accumulating too many such exhibitions it is better to guide the pupils to a closer study of a smaller number, and teach them to recognise in them the conceptions and views developed in the lessons and so stimulate them to comparison. For more searching observations photographs, with their faithful reproduction of minute but often important details, are especially well qualified. Where it is more a question regarding the characteristic features of landscapes or the situation of towns pictures may be more copiously employed.

3. *Maps.*—(*a*) *Collective Exercises of the Class.*—If all that has been stated in the foregoing is to qualify the pupil to draw pictures of actual things from the map, it is plain that he must himself *appropriate the map*, which, to be sure, remains the most important means of representation in geography.

Seeing the map presents to the eye the picture of a district of the earth with all its multiplicity of forms and other details, it will be necessary to put the whole class through a number of exercises having for their object the more distinct comprehension of the map, and a more lasting impression of it on the minds of the pupils. Such exercises are:—

*α.* The teachers (perhaps, later on, a pupil) will name mountains, rivers, islands, towns; the pupils will then look them up rapidly in their map or point them out on the wall-map.

*β.* That which is indicated on the wall-map or black-board will be at once named by the pupil who is asked to do so.

*γ.* The question will be put, which of two objects is the more remote from us, or from some other point; or,

*δ.* Which of two towns lies more to the N. or E.; what mountain chain, river, lake, sea, other large towns or town lies nearest; what mountain ranges, rivers belong to a single or several States; which of them bound (border) States; which States border on one or two seas? or other such questions. These exercises may be pursued with open and, later on, with closed maps.

With questions and answers of this kind each lesson—from the commencement, in cases where enough has been learned in the primary Schule to give opportunity for such questions, and on to the stage of the higher classes—may most advantageously be opened, seeing this exercise with the whole class of pupils arouses the interest and emulation even of the more backward children.

This is the course of procedure meant, when in what follows reference is pretty often made to the exercises accompanying the systematic instruction, and it is clear that this form of instruction is very well applicable, in the case of repetition as well, in which many a more testing question may be put regarding what has been learnt. Geography requires so much in order that the *totality* of the instruction conveyed shall form a coherent picture in the mind, that constant repetition is a principal requirement in its course of instruction.

Questions such as those above stated are intended to sustain the interest of the pupil in simple *topography*, without which all other instruction and knowledge remains confused and more or less superficial. Another task is the comprehension of the inner order and sequence ("Ordnung und Regel") in the map.

(*b*) *Drawing.*—The transference of the forms and magnitudes in the map to the minds of the pupils is effected first and foremost by the medium of drawing. Let the instruction conveyed in the class go hand in hand with drawing on the black-board, so that the form which has been described to the pupils audibly may be reproduced simply and characteristically to their eye. It is not however advisable

to spend too much time in the school on *fully executed* drawings or diagrams, or on drawing in any case. Even when occasionally more difficult contours or river lines have to be reproduced the drawing should bring out only the *typical form*. Simple straight-lined figures or curves, which indicate clearly the form, may very well serve as a basis (or framework) for the tracing of the principal features, as is also done in other freehand drawing, when the meridian and parallel are not sufficient guide to the direction to be observed. The drawing is not for the sake of drawing, but only a means by which the pupils may the better realise the leading forms and retain them in memory. Let the pupils therefore, under the guidance of the teacher, habituate themselves to firm and decided strokes directed by clear and definite conceptions. The pupil who points out any fault in the drawing of his fellow-pupil, let him step up to the board and trace out another drawing alongside of it. The comparison of the drawings with the map and, most effectually, a few corrections by the teacher, will serve to bring out and impress the true features on the pupils. The exercises with the whole class above indicated may often, too, be extended into the reproduction of lines (courses), directions, &c., by drawing. The drawings done by the pupil may be kept by him at home in a book, in which brief observations, leading indications or questions given by the teacher may also be preserved. At a later stage independent drawings may be prescribed the pupil, for the most part a small simple object, and always closely connected with the exercises and material subject of instruction. These books will thus present to the eyes of the pupil, even in later years, the course of instruction he has passed through.

(c) *Linguistic Expression.*—The reproduction in words of what in viewed on the map trains the pupils to the understanding of the forms and their relations. The schooling in this branch is of essential importance, if the superabundance of material is not to confuse rather than educate. Each new accession of material will, on the other hand, be to the pupil a real accession of knowledge and an increase of property if he is duly practised in reproducing in fit words all that he has perceived by the eye and comprehended by the mind. In this connection it will be of importance how the teacher brings out the features of the map or accompanies with words the sketch he draws on the board, follows up that exercise, perhaps, with passages of landscape description, and gathers up in pregnant memorable sayings what has been gone through; or how, in common with the pupils, he frames by process of comparison and summing-up the definitions which the visual views may seem to require. The instruction ought also, however, to qualify the pupil to take up independently the forms of the map, especially what is essential for him, and afterwards to depict it all in words. The order and law ("Ordnung und Regel") underlying the apparent imbroglio of a map will in this way grow ever clearer to the pupil. In the disposal itself of the different features lies something plastic (or formative—"etwas Bildendes"); constant comparison educates the intellectual eye; the treatment of the map thus carries in it in large part the formative energy, as it does the chief difficulty, of geography. Geography, when truly vital, holds no merely passive, but also a kind of creative or formative attitude to the features of the earth's surface, just as painting or the plastic art is in part *creation* and not mere copying.

In accordance with the purpose thus indicated, instruction ought to be so laid down as to conduct naturally without interruption or sudden spring from one step to another, so that the pupil receive not merely the map into his mind, but be able to have a correct idea of even larger and richer areas, such as they are in reality, of which the map is but a drawing, often only a mere sign.

The teacher will bear in mind that the main business of the first course is to introduce the pupil into an understanding of the map, and that the proper acquisi-

tion and characteristic description of the representations of the earth's divisions is the task only of the next course. So far, moreover, as the understanding of the map is concerned, the pupil has less to do with finding in the map what is printed in the lines of the book, than that he may find in the arrangement of the book nothing which he did not gather beforehand from the map. The home tasks of the pupil will therefore, perhaps, better consist in questions he has to answer out of the map than in parts of the text-book to be committed to memory. Of course, so far as the latter is employed by way of fixing the lesson, the teacher will give the pupils what guidance may be required.

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## L.

### 1.

### BOOKS AND APPARATUS USED IN TEACHING GEOGRAPHY AT THE REALGYMNASIUM, LEIPZIG.

*Historical Geography.*

| | |
|---|---|
| Kiepert .. .. .. .. | Biblical Geography. |
| „ .. .. .. .. | Palestine. |
| „ .. .. .. .. | Orbis terrarum antiqui tabula Geographica. |
| „ .. .. .. .. | Imperium Romanum. |
| „ .. .. .. .. | Italia antiqua; Græcia antiqua. |
| Bretschneider .. .. .. | Europe, 350 B.C. |
| „ .. .. .. | Europe, 600 B.C. |
| „ .. .. .. | Europe, in the time of Charles the Great. |
| „ .. .. .. | „ in the second half of the 10th century. |
| „ .. .. .. | „ in the time of the Crusades. |
| „ .. .. .. | „ in the time of the Reformation. |
| „ .. .. .. | „ from the Thirty Years' War to 1700. |
| „ .. .. .. | „ from 1700 to 1789. |
| „ .. .. .. | „ from 1789 to 1815. |

All the above works of Bretschneider according to Spruner-Menke.

*Mathematical Geography.*

| | |
|---|---|
| Adami-Kiepert .. .. | Terrestrial Globe. |
| Wetzel .. .. .. .. | Wall-map of Mathematical Geography. |
| Ziemann .. .. .. .. | The Northern Constellations. |

*Physical Geography.*

| | |
|---|---|
| Gerster .. .. .. .. | Diagram for Anschauungslehre. |
| de May .. .. .. .. | Map of the World. |
| Kiepert .. .. .. .. | Eastern Planisphere. |
| „ .. .. .. .. | Western Planisphere. |
| Delitsch .. .. .. .. | Projection of Europe. |
| Kiepert .. .. .. .. | Europe; also by Sydow-Vogel. |
| „ .. .. .. .. | Asia; also by Chavanne. |
| „ .. .. .. .. | Africa; also by Chavanne. |
| „ .. .. .. .. | North and South America. |
| Vogel and Delitsch .. .. | Middle Europe. |

| | |
|---|---|
| Steinhauser .. .. .. | Hypsographical Map of Middle Europe. |
| Delitsch .. .. .. .. | Projection of Germany. |
| Müller and Rulf .. .. | Germany. |
| „ .. .. | Triangle of Mountains in Upper Germany |
| Steinhauser .. .. .. | The Alps. |
| (According to Seydlitz) .. | East Alps, Sweden, Norway, Denmark. |
| Kiepert .. .. .. .. | France. |
| „ .. .. .. .. .. | The British Islands. |
| „ .. .. .. .. .. | Italy. |

*Political Geography.*

| | |
|---|---|
| Kiepert .. .. .. .. | Asia. |
| Keller .. .. .. .. | Europe. |
| Johnston .. .. .. .. | The British Islands. |
| Wagner .. .. .. .. | German Empire. |
| Stülpnagel .. .. .. | German Empire and neighbouring lands. |
| Stöhl .. .. .. .. | South-West Germany. |
| Delitsch .. .. .. .. | Saxony. |
| Ziegler .. .. .. .. | Switzerland. |
| Arendts .. .. .. .. | Spain and Portugal. |
| Schiaparelli .. .. .. | Italy. |
| Baur .. .. .. .. .. | Austria. |
| Kiepert .. .. .. .. | France. |
| Schade .. .. .. .. | South Germany. |
| Leeder .. .. .. .. | Prussia. |
| Puls .. .. .. .. .. | The Netherlands. |
| Arendts .. .. .. .. | Turkey in Europe and Greece. |
| Kiepert .. .. .. .. | The Balkan Peninsula. |
| Graef .. .. .. .. | Thuringian Lands. |
| Kiepert .. .. .. .. | The British Islands. |
| „ .. .. .. .. .. | Italy. |

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|---|---|
| A. Kirchhoff .. .. .. | Types of Races (Fischer, Cassel). |
| Lehmann .. .. .. .. | Ethnological Types (Heitmann, Leipzig). |
| Hölzel .. .. .. .. | „ „ (Hölzel, Vienna). |

Lehmann's Geographical Types are uncommonly good, and therefore largely in use in the Volksschule as well.

(Signed) Dr. Götze, Oberlehrer.

2.

## APPARATUS USED IN TEACHING GEOGRAPHY IN THE WÖHLER-SCHULE, FRANKFURT.—Dr. Kortigarn.

I.—For Sexta (Boys of 9 years of age; Latin commenced, 2 hours weekly Geography, 1 History).

1. Ravenstein, special plan of Frankfurt, Bockenheim, Bornheim.
2. Ravenstein, relief of the environs of Frankfurt.
3. Diefenbach, map of the district of the main, mounted, 10 m.
4. Geisel and Diefenbach, wall-map of Wiesbaden district.
5. Ravenstein, wall-map of Wiesbaden district.
6. Adami-Kiepert, Terrestrial Globe with horizon, meridian, compass, &c
7. Adami-Kiepert, Celestial Globe with complete armature.

8. E. Wetzel, Tellurium Lunarium.
9. Gerster, wall-map for training geographical observation; guide to the use of it.
10. Hirt, the principal forms of the earth's surface, wall-map.
11. Hirt, Tabular Geographical Views, Part I., General Geography; Part II. Typical Landscapes.
12. v. Sydow, map of the Earth in 2 planispheres, 5 m.
13. Kiepert, eastern and western planispheres.
14. Berghaus, Europe, physical wall-map.
15. Kiepert, physical wall-map of Europe.
16. v. Sydow, Europe, physical wall-map.
17. Petermann, Germany, physical wall-map.
18. Kiepert, wall-map of Palestine.
19. Kozenn, wall-map of Palestine.
20. Debes, school atlas (for the hand of the pupils).

II.—For Quinta (Boys of 10 to 11 years of age; French commenced, 2 hours weekly Geography, 1 History).

1. Kiepert, Europe, political wall-map.
2. v. Stülpnagel, Europe, political wall-map.
3 and 4. v. Haardt, wall-map of Europe physical and political.
5. v. Sydow, Asia, physical wall-map.
6. v. Sydow, Africa, physical wall-map.
7 and 8. v. Sydow, North and South America, physical wall-maps.
9. v. Sydow, Australia on Mercator's projection.
10. Kiepert, wall-map of the Old World.
11. Lehmann, ethnographic pictures.

In addition, from Sexta 6 to 20.

III.—For Quarta (Boys 11 to 12 years of age; mathematics commenced, 2 hours weekly Geography, 2 History).

1. Kiepert, physical wall-map of Asia.
2. Kiepert, physical wall-map of Africa.
3. Chavanne, physical wall-map of Africa.
4. Berghaus, physical wall-map of Africa.
5. Kiepert, physical wall-map of North America.
6. Kiepert, physical wall-map of South America.
7. Kiepert, physical wall-map of Australia.
8. Kiepert, Orbis terrarum antiquus.
9. Kiepert, Græcia antiqua.
10. Kiepert, Italia antiqua.
11. Kiepert, Imperium Romanum.
12. Gallia in the time of Cæsar.
13. van Kampen, Descriptiones nobilissimorum apud classicos locorum. Series I.–XV. ad Cæsaris de bello Gallico commentarios tabulæ.
14. Kiepert, wall-map illustrating Biblical Geography.
15. Ohmann, wall-map of Biblical History.
16. Schneider, Type-atlas (drawings, illustrative of botanical and zoological geography and of ethnography).
17. Hölzel, geographical character-pictures.
18. Wallace, geographical distribution of animals.
19. Kirchhof, pictures of races, designed to be used in teaching geography.

20. Berghaus, Ethnological atlas, comprising all the races of men, 25 tables.
21. Kiepert, Atlas antiquus, 12 maps.
In addition, from Sexta 6 to 8, 18 to 20; from Quinta 5 to 11.

IV.—For Under Tertia (Boys of 12 to 13; English in the Realgymnasium, Greek in the Gymnasium commenced, 2 hours weekly Geography, 2 History).

1. A. Mang, decomposable universal apparatus (Celestial Globe).
2. A. Mang, decomposable Tellurium Lunarium.
3. v. Stülpnagel, the German Empire and adjoining lands, political wall-map.
4. Wagner, the German Empire and adjoining lands, political wall-map.
5. Kiepert, general map of Germany and neighbouring lands.
6. Ravenstein, relief map of the Grand Duchy and Electorate of Hesse, the Duchy of Nassau, &c.
7. Dickert, relief map of Central Europe.
8. Möhl, orohydrographic and railway wall-map of Germany and Middle Europe, edited by Keil.
9. Dolezal, Austria-Hungary, physical wall-map.
10. Baur, political wall-map of the Austro-Hungarian Monarchy.
11. v. Spruner-Bretschneider, Europe in 350 A.D.
12. „ „ „ in the beginning of the 6th century.
13. „ „ „ in the time of Charlemagne.
14. „ „ „ in latter half of the 10th century.
15. „ „ „ in the time of the Crusades.
16. Wolff, historical atlas, 19 maps.
17. Ruprecht, geological wall-map.
18. Winter, school atlas, completely revised by Berghaus, 33 maps.
In addition from Sexta 17 to 19; from Quarta 12 to 15, 17.

V.—For Upper Tertia (Boys of 13 to 14; 2 hours weekly Geography; 2 History).

1. Leuder, special wall-map of the Alps.
2. Ahrendts, wall-map of the Netherlands and Belgium.
The above two also used in Under Tertia.
3. Schilling, France, photolithographic wall-map.
4. Kiepert, physical wall-map of France, without names.
5. Kiepert, political wall-map of France.
6. Murby, Great Britain and Ireland, political wall-map.
7. Kiepert, physical wall-map of the British Islands, without names.
8. Kiepert, political wall-map of the British Islands.
9. Kiepert, physical wall-map of Italy.
10. Kiepert, political wall-map of Italy.
11. Mayr, wall-map of the Balkan Peninsula.
12. Kiepert, general map of the Russian Empire in Europe.
13. Ahrendts, wall-map of Sweden, Norway, and Denmark.
14. Ahrendts, wall-map of Spain and Portugal (Halbig, Miltenberg).
15. v. Spruner-Bretschneider, Europe in the 14th century.
16. „ „ „ in the time of the Reformation.
17. „ „ „ in the time of the Thirty Years' War.
18. „ „ „ in 1700–1789.
19. „ „ „ in 1789–1815.
20. Brecher, historical wall-map of Prussia from 1415 to the present time.
In addition, from Sexta, 18, 19; from Quinta, 12 to 15; from Under Tertia, 1 to 5, 7, 8; 16 to 18.

VI.—For Under Secunda (Boys 15 years of age; 1 hour weekly Geography; 2 History).

1. Kiepert, political wall-map of Asia.
2. Kiepert, political wall-map of Africa.
3 and 4. Kiepert, political wall-map of North and South America.
5. Chavanne, map of Central America and the West Indies.
6. v. Sydow, wall-map of Australia and Polynesia.
7. Berghaus, chart of the World (general view of lines of steamers, of land and submarine telegraphs, sea-currents, &c.).
8. Berghaus, general map of the World, on Mercator's projection (German consulates, sea-routes, and postal union of the world).
9. Curtius and Kaupert, atlas of Athens and environs.
10. Kiepert, map of the environs of Rome, mounted.

In addition from Sexta 11, 18 to 19; from Quinta, 5 to 11; from Quarta, 1 to 11, 14, 15, 16 to 21; from Under Tertia, 18.

VII.—For Upper Secunda (Boys of 16 years of age; 1 hour weekly Geography; 2 hours History. With the end of this form geographical instruction also ends, when the certificate in geography obtained by the pupil is inscribed with the "Abiturienten Zeugniss," the document, namely, entitling the pupil to enter the Polytechnic Institute, have two years deducted from his period of military service, &c.

For Repetitions: From the numbers of the foregoing classes as may be required, especially from Under Secunda, 7 and 8; in addition—

1. Andree-Peschel, physico-statistical atlas of the German Empire.
2. Ruab-Müller, railway map of middle Europe.

VIII.—For Prima (Under Prima 1 year; Upper Prima 1 year. Boys of 17 to 19 years of age; 3 hours weekly History, in which Geography is referred to only as illustrative of History).

1. E. Wetzel, wall-map for instruction in Mathematical Geography, 4th edition, 1884, mounted.
2. Reuter, the Northern Heavens, wall-map.

In addition from Under Tertia 1 and 2.

For different classes and for more special questions.

1. Stieler, hand atlas, 95 maps and 170 exercise maps, bound.
2. Berghaus, physical hand atlas, 93 maps.
3. v. Spruner-Menke, historical hand atlas, 3 parts, 139 maps.
4. Menke, Bible atlas, 8 maps, bound.

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## M.

## TASKS AND METHODS OF THE GEOGRAPHY OF OUR DAY.

By Professor von Richthofen.

According to Professor Richthofen, the points in which geography comes into contact with the sciences already organised are so many, and in a large number of points the connection is so intimate, as to make it appear often impossible to draw a line of demarcation between them. It has therefore become a question whether geography can maintain itself as an independent science.

The province of geography is first and specially the *Surface of the Earth.* But there are *three surfaces:* the surfaces of the lithosphere (or geological domain), of the dry land and water (the basis of the atmosphere), and of the top of the atmosphere. If all these three surfaces belong to geography, then all the intermediate material, the atmosphere and water, is also part of geography. Geography has then to do no longer with a mathematical, but a material surface—in the case of the land as well.

1st. Measurement of the areas of land and water. Study of the forms of the land; analogies in the dispositions of continents, islands, and—

2nd. Position of the earth's surface in relation to the heavenly bodies, especially sun and moon—a branch of Astronomical Geography.

3rd. Atmosphere—constituents of atmosphere. Geography, here adopting the results and methods of chemistry and physics; temperature; density; zones of temperature; isothermal lines.

Without a knowledge of the nature (and properties) of the superficial *layer* of the earth, the surface of the earth in geography cannot be understood. For the organisms (including man) on the surface of the earth do not lie or move on the *mathematical* surface, but on and *in* it as *organic parts* of it (almost identical with it). To understand the nature of the superficial layer the geographer must take his stand on the results of geology.

4th. When the element of *time* is taken into consideration, the earth's surface appears as a datum in process of development and transformation, and the geographer has the task of investigating the processes of this transformation in the particular phenomena of particular places, and to determine the laws according to which these processes go on in the land, the water, and the atmosphere of the earth's surface, the reciprocal causal relations of the three kingdoms—land, water, and atmosphere.

5th. Plants and Animals. It is not the business of the geographer to study the different species in their distinctions (the task of the botanist and zoologist); but only the *distribution* of the different species, genera, families, orders.

6th. The summit of the geographer's task is the investigation of the relations of man to all the foregoing factors, wholly and severally.

Geography presents itself, therefore, as the science of the surface of the earth, and of the things and phenomena in causal connection therewith; not *Erdkunde*, but *Erdoberflächen Kunde.*

"To sum up: Scientific Geography has, as its first task, the investigation of the surface of the dry land of our globe, together with its hydrosphere and atmosphere, in respect of the four heads of Figure, Material Composition, Continuous Transformation, and Creation; all under the leading consideration of the reciprocal relations of the three kingdoms of Nature to one another and to the surface of the earth.

"Its second task is the investigation of the Botany and Zoology of the earth in their reciprocal relations, in the four different respects above specified, to the earth's surface.

"Its third task has reference to man and particular epochs of his material and mental culture under the same leading consideration, and in respect of the same four heads.

"There are two methods that may be followed in the execution of these tasks.

"The concretely descriptive method is employed by that geography which in its purest form, chorography, registers the treasury of facts according to a fundamental topographical principle of classification.

"The second method, which proceeds analytically, is the one that characterises general or analytical geography. It binds together in categories the objects and phenomena of all the six kingdoms of Nature presented in descriptive geography,

and contemplates them, independently of the terrestrial localities, in respect of the four heads above specified, with continual reference to the leading consideration of the causal reciprocal relations to the earth's surface.

"From the combination of both these methods proceeds the chorological method of treatment, which consists essentially in observing all factors going to the constitution of a division of the planet, or a part of these factors, in their causal co-operation. By the analytical method of investigation it is connected with general geography, by the synthetic method of presentation with descriptive geography. In its special application it appears either as chorology of a terrestrial locality or as representative of several or all the separate terrestrial localities under the consideration of a group of causal connections, such as of climatic alone, or of climate and botany, or of the influence of mountains on man. Through the introduction of a general chorological method of treatment chorography becomes intellectualised by philosophic permeation.

"It may appear presumptuous to impose on a science so vast an abundance of material and so comprehensive and many-sided tasks as would accrue to geography from the foregoing discussions. It might also readily be pointed out that excess of substance is a symptom of impending disintegration on the part of a science. For just as from mineralogy in its former state crystallography, petrography, palæontology, stratigraphy, and general geology have developed, so are already meteorology, oceanography, the geography of animals and plants, ethnography and political geography, more or less independent departments of study within the compass of geography. This multiplicity, however, becomes compacted into a unity by the oneness of the leading consideration, the consideration, namely, of the causal reciprocal relations with respect to the earth's surface. This consideration binds the intermediate links just as closely together as the terminal links,* and, seeing that the earth's surface and man have from the remotest times down to the present day ever been regarded as the most integrant parts of geography, so is it not possible to drop one of the numerous intermediate links without breaking the connection of the whole.

"We need not shrink before the fulness and scope of the task. The field is vast. The work, however, is divided among many. No man is able at this day to pursue his inquiries into all departments of geography. He, however, who devotes himself earnestly to it can appropriate enough to follow its progress in all branches, and he who, by modestly limiting his labours, has the happiness of working on one part of it, to the deepening and furthering of that section specially under his care, should ever at the same time endeavour to comprehend the relation of that part to the whole, and never lose sight of the connection of the whole."

In opposition to the general impression that geography was an easy study, and that hasty sketches of lands met with in travels or uncritical geographical compilations entitled one to the name of an expert in this field, Prof. Richthofen emphasizes the necessity of thorough preparatory culture before any valuable results could be achieved either through immediate observation of Nature or by home studies. The surest foundations for the study of geography is geology in its whole compass, as being the only means to an understanding of the earth's surface. To do any work that would add to the sum of human conquests in meteorology a knowledge of physics and mathematics is indispensable, just as a knowledge of botany, zoology, and palæontology was needed, in order to engage to any purpose in biological geography, and a study of history and statistics is of importance to original investigation in the dynamic and genetic parts of anthropological geography.

* The earth's surface and man are the *terminal* links; all else is *intermediate*.

**The particular kind of preliminary study required is, therefore, dependent on the particular object in view. A knowledge of the general results must, however, be possessed by all students of geography of whatever department. The methods of measurement and observation would have to be practically acquired by whoever would gather valuable material in lands that were still but little known. To work up the observations of Nature into scientific results, and so add to the fund of scientific geography, the student must concentrate his studies on one part of geography, and on the auxiliary sciences, which offer a basis to it, at the same time that he does not neglect the other parts.**

EXTRACT FROM PROF. H. WAGNER'S PAPER ON THE PRESENT STANDPOINT OF GEOGRAPHY IN THE 'GEOGRAPHISCHES JAHRBUCH':—

**"The ultimate and highest goal of geography is the contemplation of the terrestrial spaces with their configurations, materials and forces as the dwelling-place of man and the arena of his history." "Geography is not merely a physical but likewise a historical science, and this latter aspect, namely its historical half, was brilliantly represented in Humboldt's time by K. Ritter. The aim of geography is nothing else than to demonstrate the dependence of human society on the physical constitutions of their dwelling-place and the operations of natural laws in the great historical events of our race."—Peschel, 'Geography and History.'**

**"The former science (Geography) has to ascertain on what terrestrial spaces nature allows the greatest concentration of political ("bürgerlichen"=burgh or town or polis-like) society and where she has collected the greatest abundance of incentives to the education of man. The latter (History), on the other hand, has to elucidate from the morals, habits and conceptions of right, as primary data, the different capacities of the different nations for higher social forms."—Peschel.**

In scholastic circles Professer Wagner states Geography is still accounted down to the present day as an auxiliary discipline of history; a fact for which the host of geography manuals and text-books in use in schools are to blame.

Guthe (author of an elaborate text-book edited by Wagner) says: "Geography teaches a knowledge of the earth as the dwelling-place of man. It is by no means a bare description of the earth, with its seas, &c., but in describing the earth's surface it places man in the midst of the creation, shows how, on one hand, he is dependent on the nature surrounding him, and on the other side has endeavoured to emancipate himself from this dependence. Geography, accordingly, forms the connecting link between the science of nature and history." Guthe regards *historical* as the proper, mathematical and physical as only auxiliary, geography.

This view is supported by Kirchhoff, Marthe and Ruge.

Supan, on the other hand considers geography as a purely natural science. "Geography, as its name shows, is a science of the earth; a natural, therefore, and not a historical science."

Professor Wagner sums up the results of his review thus:—

1. The majority of geographical text-books and manuals lay the preponderating emphasis on the historical element of geography.

2. In the wide scholastic circles the prevailing opinion is, that geography is essentially a historical science.

3. Almost all the more recent "Methodiker" lay stress on the necessity of bringing the natural-scientific basis of geography into greater prominence.

4. Not one of them pleads for geography as a pure natural science.

5. Many of the modern theorists do not recognise the dualistic character of

geography, in so far as they present historical geography as but one of the kindred branches of geography.

6. The demand of the natural scientists among the geographers reaches its apex in the closer conjunction of geography with geology.

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## N.

### GUIDE TO LECTURES IN GENERAL GEOGRAPHY.

By Professor A. Kirchhoff, Halle. (*Halle*, 1884.)

#### I.—General.

Position of the earth in the universe; motion of the earth and the moon; form and magnitude of the earth.

Literature:—

Guthe-Wagner, Lehrbuch der Geographie. 5. Aufl. 2 Bde., 1882 u. 83.

A. v. Humboldt, Kosmos, Entwurf einer physischen Weltbeschreibung.

Fr. Hoffmann, Hinterlassene Werke. 1 Bd., Physikalische Geographie, 1837. 2 Bd., Geschichte der Geognosie und Schilderung der vulkanischen Erscheinungen, 1838.

Studer, Lehrbuch der physikalischen Geographie. 2 Bde., 1844 u. 47.

Reclus, La Terre. 2 Bde., 5 Edition, 1883.

Müller, Kosmische Physik. 4 Aufl., 1875.

Peschel-Leipoldt, Physische Erdkunde. 2 Bde., 2 Aufl., 1883, f.

Hann, v. Hochstetter, Pokorny, Allgemeine Erdkunde. (In 4 Aufl. erscheinend als 1 Bd. von "Unser Wissen von der Erde," 1884.)

Hann, Die Erde als Weltkörper, ihre Atmosphäre und Hydrosphäre, 1884. (Separate impressions of the first part of the foregoing work.)

Supan, Grundzüge der physischen Erdkunde, 1884.

Günther, Lehrbuch der Geophysik und physikalischen Geographie. 1884.

Heinr. Berghaus, Physikalischer Atlas. 2 Bde., 2 Aufl., 1852. (New edition being prepared.)

*Cartography and Projection.*

Literature:—

Gretschel, Lehrbuch der Landkartenprojektion, 1873.

Steinhauser, Grundzüge der mathematischen Geographie und der Landkartenprojektion. 2 Aufl., 1880.

Zöppritz, Leitfaden der Kartenentwurfslehre, 1884.

Gravity, temperature, and aggregate state of the earth.

Terrestrial magnetism.

#### II.—Atmosphere.

General constitution.

Literature:—

Hann, Handbuch der Klimatologie, 1883.

Mohn, Grundzüge der Meteorologie. 3 Aufl., 1883.

Temperature.

Atmospheric pressure and winds.

Literature:—

Supan, Statistik des unteren Luftströmungen, 1881.

Precipitation.

I had also to give lectures on Ancient History, but since that date I have taught Geography exclusively.

In discharging the functions of my office I follow in the main the lines of my teacher Neumann, whose labours I have delineated more particularly in an Article in the Proceedings of the Berlin Geographical Society, XVII., 1882, pp. 81–111.

The first and foremost place is occupied by *physical geography*, and ethnography is studied only in so far as it is indispensably included under that heading. A special, methodic, thorough course of ethnographical science, the basis of which is not a knowledge of the earth, but of the human body and of language, is not comprised in our plan of teaching geography.

My lectures do not aim at crushing into narrow compass wide and general views, but at satisfying the definite wants of the students, and bringing home to them an exact conception of the results which have been achieved in the science up to present date, and of the problems in the science now seeking solution. My répertoire of lectures is composed, as you will have found to be also the case elsewhere, of *collegia privata* and *collegia publica*. The former, generally four per week, for which the students pay fees, form the principal course. The latter, two to three per week, are given gratis, and are occasionally alternated by exercises occurring but once a week, and lasting two hours each time.

The attendance at the *collegia privata* varies, according to the particular subject of the lecturer—from 45 to 75. The attendance at the *collegia publica* is *nominally* greater—from 80 to 100; but in reality the attendance here has not the same importance, seeing that among the hearers are to be found theological, law, and philosophical students who have no special scientific interest in geography, whose object is only to include a general knowledge of this department within their general culture, and who do not, therefore, attend the whole course of lectures regularly throughout the session.

At the exercises, at which the knowledge of the students is definitely tested, there are to be found only from ten to fifteen students, and that is about the proper number, for if there were more present it would be a difficult task to engage them all in appropriate common exercises.

I here insert a list of my lectures, marking with a * such as are *collegia publica*:—

1. General Physical Geography.

Part I.—The earth as a body in the universe (form and magnitude, thickness, motion, heat of the surface and the inner magnetism).

2. General Physical Geography.

Part II.—Constituents, structure, and forms of the solid crust of the earth (including the chemistry, geology and morphology of the dry land).

3.* General Hydrography (Oceanography).
4. General Climatology.
5.* Glaciers and Ice Period.
6. Geography of Europe (horizontal and vertical formation, climatology and botanical geography of the whole Continent; and in addition special geography of Scandinavia and the British Islands).
7. Geography of the Mediterranean lands of Europe.
8. Geography of the Alps.
9.* Geography of France.
10. Geography of Germany.
11. Geography of Silesia.
12. Geography of Asia.
13.* Geography of Interior Asia (special).

Literature:—

Mühry, Die geographischen Verhältnisse der Krankheiten, 1856.

Hirsch, Histor. geogr. Pathologie. 2 Bde., 2 Aufl., 1881 u. 83.

Aggregation and settlement.

Literature:—

Kohl, Der Verkehr und die Ansiedelungen der Menschen in ihrer Abhängrgkeit von der Gestaltung der Erdoberfläche, 1841.

Dependence of the development of culture on geographical conditions.

Literature:—

Ratzel, Anthropo-Geographie, 1882.

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## O.

### BERLIN UNIVERSITY.

Ordinary series of lectures are delivered by Professor H. Kiepert at Berlin University during the course of two years (four University terms). A private series, four hours every week (*i.e.* paid by the students):—

1. History of Geography and of Discoveries.
2. Universal Physical Geography.
3. Geography of Europe
4. Geography of Asia } combining the physical and historical point of view.

*As Public Lectures, two hours per week:—*

1. Italy.
2. Greece.
3. Asia Minor.
4. Palestine, formerly, now ceded to a younger docent of the theological faculty.

The geography of Africa and America, also sometimes the special chorography of Germany, has been taught during a long succession of years by Professor Müller. Lectures on the Historical Geography of Germany during the Middle Ages are delivered once every two years by Dr. H. Bresslau, Professor of History. Some geographical specialties, particularly on Oriental countries (Egypt, Assyria, India, &c.), are also connected with the subjects treated in various lectures of Professors of Oriental Literatures.

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## P.

### COMMUNICATION ON GEOGRAPHY IN BRESLAU UNIVERSITY.

By Professor Partsch.

Breslau is one of the Universities in which geography has now for more than twenty years been practically recognised as an independent subject of study. From the autumn of 1863 to Easter 1880 my teacher, Carl Neumann, Professor of Geography and of Ancient History, gave one lecture per week on geography each session. In the autumn of 1875 I was appointed Docent; the following year I was constituted Extraordinary Professor of Geography, and in July 1881 the newly established ordinary Chair of Geography was assigned me. Till the Easter of 1880

ranean basin, the winds and currents of the Atlantic Ocean, atmospheric refraction, climatic position of the Canary Islands, definition and altitude of the snow limit, structure of volcanoes, and a whole crowd of details calling for consideration. Each point is presented by the students, who come prepared for its discussion, in accordance with Humboldt's view, which is next modified as far as may be required, and in the discussion which then arises the students mutually correct each other, and bring divergent theories to a decision. Here, too, the post of greatest difficulty devolves on the leader of the discussion,* who has to check all wandering and irrelevant debate, supply omissions out of his own fuller knowledge, and correct as far as necessary what is advanced by the students. All along, moreover, strict observation is kept regarding accuracy and precision of expression, a point on which many require long and sharp training, and a point, as seems to me, of urgent importance in the culture of future *teachers* of geography. Some other time I shall perhaps select Darwin's 'Voyage.' For those of adequate philological culture the second book of Herodotus would also prove very suitable.

If the Professor dispenses with a common reading material it becomes more difficult to give a basis for discussion. In such a case I have endeavoured to supply this defect in different ways. I once selected the *Western Alps* as the subject of treatise. I distributed among the different students the full cartographic and literary material for the different sections of these mountains, and set each the task of describing his respective part in such a manner that in the end a collective picture of this mountain system was attained. In a concluding lecture, taking account also of the geological structure, I grasped together all that had been separately advanced. Care of course was taken on the occasion of each address bearing on such abundant cartographic material, that *all* the students were in a position to follow exactly the description of each particular speaker, as also to understand my concluding, concatenating, supplementary, and critical observations. The very erroneous map of the Piedmontese staff likewise offered occasion for a critical review of maps and for an appreciation of the work, more particularly of English travellers, in settling the topography of the Graian Alps. After the heights of the Western Alps had been studied, the more minute investigation into the history of their passes was entered into. The arduous controversies regarding the history of the passes of the Western Alps in the time of the Romans were gone through with reference to the sources of the history, and especially the question of Hannibal's "crossing the Alps." A comparative valuation of the different passes for the present time naturally followed that question.

For the present I have selected a district nearer home as a field for our academic exercises, the Waldenburg Highlands, a territory particularly important for its roads of communications and for its wealth in coal, for which it has now been noted for a century. We here find a remarkable example of the dependence of the habitation of a district, and of the density and social conditions of its population, on its geological character. Old slate mountains, coal formations, red-lying land, porphyry outcroppings are here ranged so as to constitute a territory, which in each part receives a different character according to its peculiar geological foundation. The scientific valuation of this district is, accordingly, divided systematically among the students taking part in the exercises. One has assigned him the drawing of an isohypsometric chart in the proportion of 1:100,000, based on the hypsometric material already to hand, which, however, on critical scrutiny, is found to be defective; a second undertakes the literation of the coal formation of the Waldenburg basin; a third has committed to him the presentation

* The Professor himself.

of the remaining geological formations; a fourth sets forth the history of the population of the district; a fifth traces the history of how its roads were laid out; a sixth portrays the well-known states of culture obtaining in the district in the middle of last century; a seventh, the present state of the district relative to production of trade; an eighth, the statistics of population. After all are done with their preparations the results will be tested. The hypsometrical chart will be critically examined, and after the necessary corrections, multiplied autographically, *it* forms the basis for the succeeding separate tasks. As concluding results the method will then be laid down, according to which the different aspects of the nature of a country are brought into relation with the distribution and employment of its population. In general the porphyritic mountains compose forest land; the red-lying ground arable land; the productive coal mountains and their neighbourhood—a pretty narrow zone—is the industrial section, a creation of the last century. The change in the distribution of the population during the last hundred years presents also a type of the influence exercised on the culture of a county by the opening of coal mines.

The next task to be taken up—as appropriate exercises in the use of the polar-planimeter—will be calculations of the areas of the separate geological formations, as also of the high regions of the Waldenburg district. From these data values may then be inferred for the distribution of the population and its principal occupation throughout the separate and physically different zones of the district; the facts of the different human conditions of the different sections are to be referred to their relative communicableness, fertility, and mineral resources. The history of population and the history of the development of intercourse must also be brought into relation with the relief of the land.

It is not impossible but that the result of all these various studies will be a work worthy of publication. In that case I should have the pleasure of forwarding you a copy of the work as a sample of the labours of my students. Be that as it may, I promise myself from this scientific utilisation of a district, within half an hour of Breslau by railway, far more profit for the vitality of geographical study, and for the comprehension of geographical fact, than could be hoped for from the discussion of far-distant places, which can be grasped only by the imagination and with the help of foreign description. It is no doubt true that the remote exercises a certain charm of its own, and for this reason I once adopted, as the subject of academic exercises, the history of the discovery of the Lake district of Central Africa. The main point here was the discussion of the different ways in which travellers viewed foreign lands (astronomical determination of latitude and longitude, barometrical measurement of heights, routes, construction, &c.). The way in which the progress of knowledge was effected was an aspect in the business which we also took home to us; the students were in a certain measure made to live through anew in one session the period of discovery here under review, taking parts, not only in the fates and fortunes of the travellers themselves, but likewise in the critical discussions attaching to their experiences and communications. The protocols of sittings in the Proceedings of the English Geographical Society have offered us the most interesting material, of which the historians of discoveries too little avail themselves. All historical discussions on these matters, which proved of the utmost consequence for subsequent successes, though also marred, it is true, by misconceptions, were followed and anew weighed and deliberated upon by us. In the manner above indicated there gradually developed before the eyes of the students, who themselves undertook respectively reports of the different travels, an ever clearer picture of the great lake region.

From the above communication you will already have gathered the sense in which we conceive and cultivate geography at this University. A word now as to

our teaching apparatus. With the very limited means at our disposal (730 marks a year for purchase of new material), we have to avoid scattering our disbursements over a too wide field. I have no great enthusiasm for telluriums, and do not, therefore, feel any soreness at having to do without them. The main requirement with me is *good maps*, and of these we have indeed a very fair collection. The older and newer Government Survey maps of all European countries are represented in our collection, and are placed before the eyes of the students as much as possible, that they may be able to appreciate and properly interpret them. In my course of lectures on the Alps, for example, which I again give this winter, I have devoted about six lectures to a minute discussion and criticism of the Alpine cartography, and more particularly of the methods for representing relief by means of shading under supposition of vertical and oblique illumination, isohypsometric lines, altitudes, &c. It is only by *much seeing* that the power of readily reading maps becomes developed. Care has of course been likewise taken to procure an abundance of *geological* maps; comprehensive maps of *all*, special maps of separate countries of Europe. As regards foreign continents I am but scantily furnished; but in a few years, by judicious expenditure of our means, we hope gradually to supply this omission.

*Reliefs* cost too much money, and are only in exceptional cases indispensable. I have but two at my disposal for my course of lectures on glaciers; a relief of the Glockner group with the Pasterze, and a relief of the Glacier Garden in Lucerne.

I am now engaged in collecting specimens of the most important stones to illustrate my course of lectures on Silesia.

Of instruments we have only a good Amsler polar planimeter; a few barometers belong to me personally.

For the purchase of books, seeing we have only the grant of the University for the purchase of apparatus above specified, we have but very spare means. What is necessary I procure from the Royal University Library. For my institute I have managed to acquire only the Proceedings of the Royal Geographical Society, which, strange to say, were wanting to it.

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## Q.

### PROGRAMME BY Dr. FRIEDRICH UMLAUFT (*Keeper of the Geographical Collection*) OF OBJECTS DESIRED FOR PROPOSED GEOGRAPHICAL MUSEUM AT MARIAHILFER GYMNASIUM, VIENNA.

1. Views of landscapes, towns and eminent buildings; pictures of types of races and peoples, national costumes, &c.; photographs or coloured drawings.

2. Models of dwelling-houses, tents, ships and other apparatus of transport; technical apparatus.

3. Weapons: household, agricultural, fishing and hunting gear; implements. Originals or models.

4. Coins and other articles of exchange (Kauri mussels, glass, pearls, pieces of salt).

5. Characteristic industrial products, webs, basketwork, carved works, lacquered wares, paintings, idols, amulets, &c.

6. Specimens of different kinds of stone: from the Alps—gneiss, granite, dolomite, porphyry, limestone; from the Carpathians—sandstone, trachyte, basalt; also tuff, lava, desert sand, &c., with label of place whence brought.

7. From the animal kingdom: musk-bag, castoreum, turtle, isinglass, whale-

bone, guano, locusts, termites, cochineal, scorpion, tarantulæ, pearl mussels and pearls, trepan, &c.

8. Vegetables used as food: rice-plant, maize, millet, Indian corn, durra, earth-nut, tubercles of manioc, yams and batate, olives, cocoanut, bread-fruit, arrowroot, sago, dates, different kinds of tea, cacao, sugar-cane.

9. Spices and medicines: nutmegs, betel leaf, Peruvian bark, &c.

10. Dyeing and tanning materials, resins: galls, dragon's blood, madder-root, indigo, catechu, mastich, frankincense, gutta-percha, caoutchouc.

11. Materials for weaving: cotton, jute, manilla hemp, Indian palm-fibres, &c.

12. Useful woods: beech-tree, amboina, guiava, ebony, jacaranda, mahogany, cork-bark, &c.

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## R.

### GEOGRAPHICAL PROGRAMME OF THREE YEARS' COURSE OF VIENNA COMMERCIAL ACADEMY, 1884.

*First Year.*—General appropriation of the most important conceptions of mathematical and physical geography, especially of such as have a more immediate bearing on the mercantile departments. Commercial geography of Austria-Hungary, Germany, and Switzerland; more particularly the position in the world, topographical situation and configuration of these countries, climate, agricultural fertility, and commercial products of the three realms, where and how produced, population, commercial capacity, commercial languages, emigration and immigration, agricultural, industrial, commercial and financial organisations, also means of communication in each country. Consideration of the most important commercial places, harbours and industrial centres. Marine connections. Imports and exports. Two hours per week.

*Second Year.*—Commercial geography of Holland, the three Scandinavian kingdoms, England, Belgium, France, Spain, Portugal, Italy (including present colonies). Details as in first year. Two hours per week.

*Third Year.*—Commercial geography of Turkey and the Levant, Russia, the United States of North America, Mexico, Brazil, States of La Plata, Chili, China and Japan. Details as in first year.

Geographical statistical survey of the commercial world at the present time and its principal routes. Two hours per week.

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## S.

### GEOGRAPHICAL PROGRAMME OF THE LYCÉES OF FRANCE ACCORDING TO DECREE OF 22ND JANUARY, 1885.

*Preparatory Class* (1½ hours per week).

Elementary notions of general geography to define and communicate by descriptions and examples taken as much as possible from the commune, canton, and department in which the pupils reside, the meaning of the principal terms in physical geography; to indicate on the globe and blackboard the position of the continents, and more particularly the positions of Europe and France.

Notions on the physical geography of France, again laying stress on the geography of the commune and department.

Simple definitions and descriptions; elements of geographical representations with the aid of the terrestrial globe, map and blackboard.

The object of the first year's course should be not to impart to the pupil a long list of names and places, but to accustom him to the use of geographical terms and instruments, such as globes, maps, and plans, to read which should be the principal task of the class.

*Eighth Class* (1½ hours per week).

Elementary geography of the five divisions of the earth.

Principal voyages of discovery.

The sea and the continents; the oceans; the five divisions of the earth; the Polar Regions.

Europe, Asia, Africa, America, Oceania; their several configurations and limits; seas, principal gulfs and straits, capes, islands, peninsulas; chief mountain chains, rivers and lakes; remarkable animals and plants; principal states, with their capitals; chief commercial ports and important towns.

Principal voyages of discovery from the fifteenth century to the present.

*Seventh Class* (1½ hours per week).

Elementary geography of France. (The teachers carefully to avoid entering into minute details.)

Configuration.

Coasts: seas, gulfs, straits, capes, islands; principal ports (military and commercial).

Frontiers by land: eastern frontier before and since 1871.

Mountains: Alps, Jura, Vosges, Cévennes and central group, Pyrenees; chains, (summits and *cols*), plateaux, great plains.

Principal basins: Rhone, Garonne, Loire, Seine, Somme.

Ancient provinces and departments: principal places.

Principal colonies of France.

(Elements of geographical drawing with the aid of map and blackboard.)

*Sixth Class* (1 hour per week).

General geography of Europe and the Mediterranean basin.

Configuration, limits, and dimensions of Europe; seas washing it. The Mediterranean: chief divisions, gulfs, straits, islands, archipelagoes, peninsulas, capes.

Relief of the surface of Europe: chains of mountains; description of the principal chains (height, limit of perpetual snow, glaciers, necks, valleys, characteristic plants and animals), volcanoes, plateaux, great plains.

Waters: discharging into the Caspian and Mediterranean; discharging into the Atlantic and Arctic Ocean; description of the most important rivers; lakes and marshy lands.

States of Europe (excepting France); capitals, principal divisions and principal towns.

Maritime countries of the Mediterranean, outside of Europe; summary description of Asia Minor, Syria, Palestine, Egypt, Tripolis, the Atlas region (Tunisia, Algeria, Morocco).

*Fifth Class* (1 hour per week).

Geography of Africa, Asia, Oceania, and America.

The sea; surface and depth; tides; describe the five oceans.

Africa, Asia, Oceania, and America; physical geography; configurations and

dimensions; seas, islands, capes, straits, mountain chains, plateaux and great plains, rivers, lakes. Enumeration of the principal states, capitals, important towns, and commercial ports.

European possessions.

*Fourth Class* (1 hour per week).

Geography of France.

Configurations and dimensions of France; superficies.

Seas and coasts, gulfs, islands, peninsulas, capes, dunes, cliffs, seashores, rocky coasts, salt marshes, lagoons, principal ports.

Frontiers by land and sea; territories lost to France in 1871.

Relief of surface; mountain chains, groups, plateaux and plains (altitude, line of perpetual snow, glaciers).

Waters, running and standing; rivers and affluents, lakes, pools, marshes.

Climate and principal productions.

Political geography; ancient provinces, departments, chief places, important towns.

Canals. Principal railway lines.

Algeria. Colonial possessions of France.

*Third Class* (1 hour per week).

Physical, political, and economical geography of Europe.

1st. General Study.

Boundaries and superficies of Europe.

Configuration of Europe.

Seas; description of coasts.

Relief of surface; orographic systems; plateaux and plains.

Rivers; principal centres of water distribution; principal groups of lakes. Isothermal lines, winds and rains; maritime and Continental climates. Relations between vegetation and climate; Mediterranean flora; steppes, forests of the North. Climatic limits of the olive, vine, cereals, trees.

2nd. Particular Descriptions of States.

The characteristic features of the physical geography, the political geography, the most important administrative or historical divisions, the principal towns, the economical geography (agriculture, minerals, industry, ways of communication, commerce), population, language, religion—of each State.

Comparative Summation.—Comparative area of states; productions and commerce; density of population; races; languages; religions; military forces.

*Second Class* (1 hour per week).

Geography of Africa, Asia, Oceania and America.

*General Geography.*—The atmosphere: trade winds and variable winds; monsoons; cyclones; rain distribution; isothermal lines: climates; floras. The sea: marshes; currents. The depth of the seas. Polar regions. The continents: comparison of the principal features of the physical geography of the five divisions of the globe—mountains, plateaux and plains, rivers.

Elementary notions regarding the division of the human races.

*Africa, Asia, Oceania, America.*—Relief of surface, rivers, lakes. Natural regions. Populations, emigrations, languages, and religions. Principal states. European colonies, excepting those of France.

Economical Geography.—The most important productions of agriculture, mines, industry. Commerce: principal ports. Ways of communication by land and sea, more particularly Egypt, the Indian Empire, Indo-China, China and Japan, Russian Asia, the United States, Brazil, the British and Dutch Colonies.

Commercial relations of the five divisions of the globe.

Great steamship and telegraph lines.

Summary history of geographical discoveries.

*First Class* (Classe de Rhétorique. 1 hour per week).

Physical, political, administrative, and economical Geography of France and its Colonial Possessions.

Position of France.—Detailed description of French territory.

Coasts.—Comprehensive view of the geological constitution of French territory. Orographical system: mountains, plateaux and plains. Mean elevation of the principal regions.

Water System.—Climate; temperature; prevailing winds; rain.

Frontiers.—Natural defences and fortified places of France and the neighbouring countries. Military forts.

French language and nationality.

Territorial formations of France.

The Ancient Provinces.—Actual organisation: commune, canton, arrondissement, département.

Public Powers.—Central administration: the ministries. Organisation of the principal services of State.

Agricultural.—Zones of cultivation: agricultural regions. Products; fish.

Quarries and Mines.—Industry. Principal industrial centres.

Routes, canals, railways, posts, telegraphs, river and maritime navigation. Commerce: importation, exportation, transit. Principal centres of commerce and large towns.

Population: density, movement of population. Influence of the physical or economical state of the different regions on the distribution of the population.

Algeria.—Physical description, products, ways of communication, commerce. Population, colonisation, administration.

Colonial Possessions of France.—Physical description, productions, navigation, fish, commerce, penitentiary establishments. Protected countries. Administration.

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## T.

## GEOGRAPHICAL PROGRAMME OF COLLÈGE DE FRANCE FOR THE YEAR 1884–85.

THE BRITISH COLONIES OF AUSTRALIA.

| | | |
|---|---|---|
| 1st (opening) | Lecture .. | The history of European colonisation and emigrations, down to the 19th century. |
| 2nd | Lecture .. .. .. | European discoveries in Australia. |
| 3rd | ,, .. .. .. | Do. (continuation). |
| 4th | ,, .. .. .. | Orohydrography of Australia. |
| 5th | ,, .. .. .. | Climate, fauna, and flora of Australia. |
| 6th | ,, .. .. .. | General history of Australasian colonisation. |
| 7th | ,, .. .. .. | Do. (continuation). |

| | | |
|---|---|---|
| 8th | Lecture .. .. .. | Population of Australia and life of the colonists. |
| 9th | „ .. .. .. | Do. (continuation). |
| 10th | „ .. .. .. | Government, finance and instructions in Australia. |
| 11th | „ .. .. .. | Births and deaths; immigration. |
| 12th, 13th | „ .. .. .. | Conditions of vitality of Australian population (continued). |
| 14th, 15th | „ .. .. .. | Policy of immigrations; companies of colonisation; sale of public lands. |
| 16th | „ .. .. .. | History of the gold mines; the production of gold in Australia. |
| 17th | „ .. .. .. | Do. (continuation). |
| 18th | „ .. .. .. | Comparison of the production of gold in Australia and other countries of the world. The economical effects of the increased field of gold during the last 40 (?) years on gold and silver. |
| 19th | „ .. .. .. | General conditions of agriculture in Australia. |
| 20th | „ .. .. .. | Do. (continued). |
| 21st | „ .. .. .. | Cereal productions and commerce in Australia. Comparison of the general commerce of cereals in the world, and how that commerce affects Europe economically. |
| 22nd | „ .. .. .. | Do. (continued). |
| 23rd | „ .. .. .. | Sheep rearing in Australia. |
| 24th | „ .. .. .. | Do. (continued). |
| 25th | „ .. .. .. | Production and commerce of wool in Australia and the world. |
| 26th | „ .. .. .. | Ways of communication in Australia: roads, railways, telegraphic lines. |
| 27th | „ .. .. .. | Influence of ways of communication on colonial progress. |
| 28th | „ .. .. .. | Commerce of the Australasian colonies. |
| 29th | „ .. .. .. | Do. (continued). The special advantages accruing to England from her commerce with the Australasian colonies. |

In the second session the Professor will deal with Tasmania, New Zealand, the projected confederation of the Australian colonies, New Guinea, Dutch East Indies, and the Phillipines.

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## U.

### SYLLABUS OF GEOGRAPHICAL KNOWLEDGE REQUIRED BY CANDIDATES IN ORDER TO OBTAIN ADMISSION TO THE ÉCOLE SPÉCIALE MILITAIRE OF FRANCE (ST. CYR), 1885.

The Earth.—Its different movements; poles; great circles; longitude; latitude; itinerary measures.

Division of the earth into two masses; ocean and land.

Ocean.—Its division into five parts; ocean currents.

Land.—Its division into five parts; populations; races; religions.

Europe.—The six great European States; the secondary states.

The seas of Europe; coasts; islands; straits, &c.

Division of Europe into mountain groups—height and character of these groups (in particular the Alps and the Hercynian system); principal railway lines.

France.—Geographical situation; extreme longitude and latitude; limits.

Physical geography.—Seas; their description; coasts and islands.

Orography.—Pyrenees; Alps; Jura; Vosges; Central Plateau; Cévennes and secondary groups—principal crests.

Hydrography.—Detailed descriptions of the regions traversed by the Rhine, the Meuse, the Escaut, the Somme, the Seine, the Orne, the Vilaine, the Loire, the Charente, the Garonne, the Adour, the Rhône, and their principal affluents.

Description of the littoral basins of the North Sea, the English Channel, the Gulf of Gascony, and the Mediterranean.

Political geography.—Frontiers, their outline; ancient provinces; departments formed out of them.

Administrative Divisions.

Railways.—Great lines; their mutual relations and relations with the principal foreign networks. Internal navigation; navigable rivers and canals.

Canals.—Their relation to the main foreign routes of navigation.

Colonies of Asia, Africa, America, and Oceania.

Algeria.—Physical and political description; extent and limits.

Coasts.—Orography and hydrography; high plateaux.

Sahara.—Political divisions; principal railways.

A more profound study of the regions watered by the Scheldt, the Meuse, the Rhine, the Weser, the Elbe, the Vistula, and the Niemen. Succinct study of the other rivers of the northern watershed of Europe.

A more profound study of the regions traversed by the Ebro, the Po, and the Danube. Succinct study of the other watercourses in the region sloping to the Mediterranean.

Boundaries.—Population; races; religions; government; political divisions; commercial and industrial sources of wealth in the different European states.

Asia.—Descriptions of its seas, coasts, islands, capes, &c.

Orography; hydrography; political divisions.

European Colonies; the Indian Empire; Cochin China; Tonkin; Annam (summary notions).

Africa.—Descriptions of its seas, coasts, islands, capes, &c.

Orography and hydrography; political divisions; European Colonies; detailed study of Algeria, Tunisia, Tripoli, Madagascar (summary notions).

America.—Description of its seas, coasts, islands, capes, &c.

Orography and hydrography; political divisions; European Colonies; detailed study of the United States.

Oceania.—Archipelagoes and islands; European Colonies.

*Note.*—The Examiners will lay special stress on France and Central Europe. Out of three questions, for example, put to a candidate one should have reference to France, a second to central Europe, the third to the rest of the programme.

Candidates must also be able to draw on the blackboard sketches of all the geography in the programme relating to France and conterminous countries.

# U*.

## FRANCE.—ÉCOLE SUPÉRIEURE DE GUERRE.

### 1e Division. 1884.—Travail d'Étude de Géographie.

MMrs. les Officiers de la 1ère Division traiteront une des questions suivantes, a leur choix, comme application du cours de Géographie :

Discussion des propriétés offensives et défensives :

1° „ de la frontière allemande de l'ouest,
2° „ de la frontière allemande de l'est,
3° „ des frontières occidentales de la Russie,
4° „ de la frontière autrichienne vers l'Italie,
5° „ de la frontière autrichienne vers la Russie,
6°. Discussion du système de défense de l'Italie du Nord.
7° „ de l'Italie centrale.
8°. Discussion des conditions stratégiques du théâtre de guerre de la Bulgarie et de la Roumélie.
9°. Stratégie maritime du bassin de la Méditerranée. Positions stratégiques, leur importance et leur rôle.
10°. Discussion de la situation stratégique respective des Russes et des Anglais dans l'Asie centrale.
11°. Etude comparative de la politique coloniale de la France et de l'Angleterre dans l'Indo-Chine. Importance du Tonkin.

Toutes les parties de ces différents programmes peuvent ne pas être traitées avec le même développement. Les questions sont posées en termes généraux dans le but de laisser aux officiers la plus grande initiative. Ils devront s'abstenir de toute nomenclature inutile et s'efforcer d'exposer avec indépendance les idées personnelles e leur aura suggérées une étude réfléchie du sujet choisi.

### 2e Division.—Travail d'Étude de Géographie.

Comme application de la première partie du cours de Géographie (Géographie de la France) les officiers de la 2e Division traiteront une des questions suivantes à leur choix :

1°. Frontière du Nord entre Valenciennes et Mézières, lignes d'invasion ; lignes de défense ; lignes de retraite.

Recherche d'une position de concentration et d'un front de déploiement dans l'hypothèse d'une invasion par la trouée de la Sambre.

2°. Étude du massif de Saint-Gobain et des flancs de cette position, de Péronne à Reims par Laſère et Laon.

3°. Étude de la région comprise entre Paris et les collines de la Brie Champenoise au point de vue des obstacles qu'elle offre pour protéger Paris dans le secteur compris entre l'Aisne et la Seine.

4°. Discussion des propriétés défensives de la région comprise entre Mézières, Verdun, Villers-en-Argonne et Reims.

5°. Étude de la Zône frontière entre Pont-à-Mousson, Lunéville et Neufchâteau.

Discussion des propriétés défensives du terrain. Recherche d'une position de concentration.

6°. Discussion des propriétés défensives de la région comprise entre la Sane (de Trèves à Deux-ponts), la Moselle, les Vosges et le Canal de la Marne au Rhin, dans l'hypothèse d'une offensive française dirigée du Sud au Nord.

7°. Étude de la région comprise entre le Donau, le Ballon d'Alsace et Épinal. Les propriétés défensives.

8° Étude du Morvan. Son rôle dans le système général de la défense de la France.

9°. Étude de la frontière du Jura entre Belfort et Pontarlier au point de vue de la défense et de l'attaque.

10°. Discussion du système de défense de la frontière des Alpes, depuis le Mont Blanc, jusqu'à l'Enchastraye.

11° Discussion du système de défense des Alpes depuis le Mont Viso jusqu'à la Roya.

12° Algérie. Considérations sur le système d'occupation militaire du Sahara.

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Il est recommandé aux officiers d'indiquer les cartes dont ils se sont servis et, lors-qu'il y a lieu, d'en joindre des fragments à leur travail, pour l'intelligence du sujet.

Les questions qui sont proposées doivent être considérées comme un cadre d'ensemble dans lequel il n'est pas nécessaire de se restreindre, et qu'il n'est pas nécessaire non plus de remplir complètement lorsque cela entraînerait à de trop longs développements. Il est laissé une grande latitude à l'initiative personnelle des officiers, autant dans le choix du sujet, que dans la manière de le traiter. Il leur est recommandé d'éviter les nomenclatures et les détails oiseux, d'apporter un grand soin à la discussion, et de rendre leur style aussi concis que possible.

### 1ère Division.—Cours de Géographie, 1884-5.

| | | |
|---|---|---|
| 1ère | leçon | Cochinchine et Tonkin. |
| 2 | „ | Europe centrale, Exposé d'ensemble. |
| 3 | „ | Allemagne, Frontière française. |
| 4 | „ | Hollande, Côtes de la mer du nord. |
| 5 | „ | Allemagne, Frontière russe. |
| 6 | „ | Autriche, Hongrie, Races en frontière russe. |
| 7 | „ | Autriche, Hongrie, Frontière italienne. |
| 8 | „ | Italie du nord. |
| 9 | „ | Italie centrale. |
| 10 | „ | Péninsule du Balkans. |
| 11 | | |
| 12 | „ | Caucase ou Asie mineure. |
| 13 | „ | Asie russe. |
| 14 | „ | Bassin de la Méditerranée. |
| 15 | „ | Angleterre, Routes de navigation du globe. |
| 16 | „ | Algérie, Sénégal, ou Congo. |
| 17 | | |

### 2e DIVISION, 1884-1885.—Programme d'Examen de passage de 1ère en 2e Division.

Division de la France en massifs et en bassins géologiques.—Limites et description sommaire du bassin de Paris;—du bassin du Sud-Ouest et des Pyrénées;—du bassin du Sud-Est et du massif central.

Description de la Belgique. Son système de défense. Anvers, la ligne Demer-Rupel.—La Meuse, Namur et Liége.

Discussion des conditions de la neutralité Belge.—Organisation défensive de la frontière du Nord—Détails du front Valenciennes, Maubeuge, Mézières.—Le massif de St. Gobain—La ligne de la Somme—Le pays de Bray et la position de Creil.

La frontière entre Mézières et Verdun, 4e et 5e crêtes.

La frontière entre Verdun et Toul—L'Argonne et les positions de la 2e crête.

Les Vosges—Le triangle : Toul, Donon, Ballon d'Alsace. La région : Toul, Neufchâteau—Épinal et les lignes de concentration —La haute-Meuse et les lignes successives jusqu'à Langres et à Dijon—Le Morvan.

La Falaise de Champagne—La ligne de l'Ourcq et les massifs forestiers de la région entre Seine-et-Marne. La région entre Orléans, Le Mans et Alençon.

Le Rhin, ses ponts de chemins de fer et les lignes ferrées de concentration.—La région entre Moselle-Vosges et Sarre (r. g.)—Conditions défensives—Région entre Moselle-Rhin et Sarre (r. d.)

Le Jura—Orographie spéciale—Étude du Plateau Séquanais—Hydrographie de cette région—Discussion des conditions de la défense de cette frontière.

(4e) Belfort.

(2e) de St. Ursanne au col de Jongue.

(3e) de Jongue à St. Genix sur Guiers.

La Suisse—Exposé d'ensemble du système des Alpes principales—Routes d'Italie (Rhône, Reuss, Rhin)—Plaine suisse et ses lignes de défense—La Venoge.—La Linthe.—Sursée.

Alpes françaises—Configuration générale.—Division en trois fronts.—Alpes de Savoie.—Zône neutralisée.—Système de défense de la Carentaise et de la Maurienne.

Alpes du Dauphiné—Massif de l'Oisans—Importance offensive et défensive de Briançon.—Le Queyras et l'Ubaye.—Alpes de Provence, leur physionomie.—Frontière des Alpes-Maritimes.

Le Var et ses affluents—Chemins internationaux.—Nice et les défenses de la Roya.

Pyrénées méditerranéennes—Orographie—Passages principaux—Hydrographie—Étude de la Catalogue. Discussion de la défense des Pyrénées orientales—*Pyrénées Atlantiques.* Importance de la Chaîne—Cols ; routes principales—Lignes de défense de Pampelune à Toulouse.

Tunisie—Configuration d'ensemble.

Algérie—Description sommaire des montagnes du Tell, de la Chaîne Saharienne.

Route d'Oran aux Oulad ; Sidi ; Cheikh.

„ d'Alger à Laghonat et au Mzab—Le djebel Amour.

„ de Constantine à Tongourt et Onargla—L'Aurès.

Les grands Chotts du Sud—Les routes d'Insalah.

## EXAMENS DE SORTIE. QUESTIONNAIRE DE GÉOGRAPHIE.

1. Exposé du système orographique de l'Europe (croquis d'ensemble). Côtes lorraines—Frontière française entre Verdun et Toul.

2. Le Rhin de Bâle à Coblenz. Ponts et places fortes.

Division de la France en massifs et bassins géologiques—Limites et description sommaire du bassin de Paris.

3. Côtes allemandes de la Mer du Nord et de la Baltique—système de défense.

Frontière française entre Toul et le ballon d'Alsace—Lignes ferrées de concentration.

4. Frontières orientales de l'Allemagne—Places fortes et chemins de fer.

Algérie—Description sommaire du Tell de la province d'Ora.

5. Système défensif de la Hollande.

Frontière française entre Mézières et Verdun.

6. Répartition des races de l'Empire austro-hongrois (croquis d'ensemble). Frontière française de Valenciennes à Mézières.

7. Ensemble de la frontière austro-italienne—Positions stratégiques des Italiens sur la ligne de l'Adige.

Importance défensive du massif de St. Gobain.

8. Système de défense de l'Italie sur la frontière française—Forts d'arrêt de la ceinture des Alpes depuis le Petit St. Bernard jusqu'au col de Tende—Rôle du Montferrat, d'Alexandrie et de Plaisance.

Algérie—Description sommaire de la Kabylie.

9. Répartition des races de la Péninsule des Balkans—Plateau de Mœsie—Limites sommaires des nouveaux états—Croquis d'ensemble, chemins de fer du Vardar et de la Maritza.

Système de défense des Alpes françaises du Mont-Cenis au col de l'Argentière-Briançon, le Queyras et l'Ubaye.

10. La place d'armes du Caucase et l'Arménie—Importance de Batoum, de Bakou, d'Alexandrète.

Frontière du Nord de la France de Dunkerque a Maubeuge.

11. La Suisse—Plaine suisse, ses lignes de défense naturelles. Position Brugg—Zurich—Position de Sursée.

Algérie—L'Aurès, les Grands Chotts, la route d'Onargla.

12. Positions des Russes dans l'Asie centrale—Turkestan et Gouvernement transcaspien—Route des Indes par Hérat.

Frontière des Alpes de Provence depuis le col de l'Argentière; le Var et ses affluents. La ligne de la Roya—Routes et fortifications.

13. Frontières polonaises de l'Autriche—Ses lignes d'opération. Cracovie et Przemysl.

Pyrénées—Description géologique d'ensemble—Frontière des Pyrénées méditerranéennes.

14. Belgique—Son système de défense; les conditions de sa neutralité;—Anvers, la ligne Demer-Rupel;—La Meuse, Namur et Liège.

Tunisie—Description sommaire d'ensemble.

15. Ensemble des frontières russes du côté de l'Allemagne et de l'Autriche—Hongrie—Ligne de la Narew.—Varsovie, Brest, Litowski, Michaïlograd.

Les Vosges—Description d'ensemble—Rôle stratégique de la région comprise entre Toul, le Donon et le Tallon d'Alsace.

16. Défense de l'Italie centrale contre une attaque française—Routes militaires des Apennins toscans—Rôle de Plaisance, de Bologne—Positions défensives pour couvrir Rome.

Frontière française du ballon d'Alsace au Lomont.

17. La Cochinchine et le Tonkin—Routes commerciales entre la Chine d'une part, l'Indo-Chine et la Birmanie de l'autre.

Alpes françaises—Leurs divisions naturelles en trois fronts—Système de défense de la Tarentaise et de la Maurienne.

Tripolitaine—Son importance—Action religieuse et politique de l'ordre des Senousia.

Le Jura—Description géologique d'ensemble—Système de défense.

19. Routes et défenses du Tirol—Ancien quadrilatère de l'Adige—Mincio.

Algérie—Le Djebel-Amour et les Ksour du Sudoranais—Les Oulad-Sidi-Cheikh.

20. Les Grandes Alpes, du Mont Blanc au col de Reschan—Description sommaire—Principales routes militaires entre l'Italie et la Suisse.

Frontière franco-allemande—Région comprise entre le Rhin et la Moselle—Lignes naturelles de défense des Allemands. Lignes principales de concentration.

21. Positions stratégiques des Anglais sur les grandes lignes de navigation du globe.

1° dans la Méditerranée; 2° dans l'océan Atlantique; 3° dans les mers des Indes et de la Chine; 4° dans l'Océan Pacifique.

Frontière des Alpes de Savoie. Zône neutralisée—Région Subalpine.

22. Roumanie et Transylvanie—Le Danube depuis Orsova. Question des embouchures—Routes des Alpes de Transylvanie—Extension de la race roumaine.

La Haute Meuse et la région comprise entre Neufchâteau, Épinal et Langres, au point de vue de la concentration et à celui de la défense.

23. Allemagne du centre entre le Rhin et l'Elbe—Bassin du Main—Esquisse de la campagne de 1866.

Le Morvan—Description géographique et rôle stratégique.

24. Divisions naturelles de l'Allemagne au point de vue des races et des langues —Allemagne du Sud—Bassin supérieur du Danube—Ulm, Ingolstadt, Ratisbonne.

La Falaise de Champagne, son rôle stratégique—Massifs forestiers de la région entre la Seine et la Marne. Ligne de l'Ourcq.

25. Le Rhin de Coblenz à Wesel—Lignes ferrées de concentration des Allemands sur la frontière belge.

Théâtre d'opérations compris entre la rive droite de la Loire, la rive gauche de la Seine et le Bocage normand—Orléans, le Mans, Alençon—Esquisse de la campagne du Général Chanzy en 1870.

26. Organisation politique de l'Empire austro-hongrois—Rivalités des Allemands, des Magyars et des Slaves—Description géographique de la Bohème—Tendances politiques des Tchèques—Importance d'Olmutz.

Pyrénées Atlantiques—Routes principales—Système de défense—Esquisse de la campagne du Maréchal Soult, en 1814.

27. Défense de l'Italie centrale contre une attaque autrichienne—Routes militaires des Apennins romains et des Abruzzes. Rôle de Bologne, d'Ancône—Position du lac Trasimène.

Rôle défensif de la région comprise entre Langres, Dijon et Besançon.

28. Esquisse géographique sommaire de l'Asie centrale—Plâteau de Pamir, Kaschgarie, Afghanistan—Frontière occidentale de l'Inde anglaise.

L'Argonne et les conditions défensives de la région comprise entre Reims et la Meuse (2e, 3e et 4e crêtes).

29. Les Grandes Alpes, du col de Reschen à Vienne—Description sommaire—Principales routes militaires et chemins de fer autrichiens de concentration.

Conditions défensives de la région comprise entre la Somme, la basse Seine et la Rille—Pays de Bray—Position de Creil.

30. Système de défense de l'Italie sur sa frontière maritime de Vintimille à Civita Vecchia—Forts des Alpes de Ligurie. Possibilité d'un débarquement.

Algérie—Routes des caravanes vers le Touat: 1° par le Sud oranais ou Figuig; 2° par Onargla—Vallées de l'Oued Tgharghar et de l'Oued Mia—Itinéraire de la mission Flatters.

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## V.

### ITALY.—NORMAL SCHOOL PROGRAMME IN GEOGRAPHY.

#### 1st. General Directions.

Objective and observational method.

Geographical features of the place in which the school is situated.

Pronounce no new name without giving a particular description of the place or object it refers to.

For the description of places, and of towns especially, show objects, photographs, or drawings referring to them. Draw the features occasionally on the blackboard, the pupil to reproduce the drawing in his copy-book, with explanatory names. Statistics to be represented by small comparative squares.

The teaching of geography will be conducted in the elementary school, according to the same method as in the Normal School; proceeding always from the particular to the general: *school, commune, province, state, Europe, the earth, the solar system, the universe.*

2nd. Preparatory Course.

1*st Class.*—Orientation: *the school, commune, province.*

Orohydrographic configuration.

Ways of communication between the commune and surrounding communes.

Short description, with illustrations, of monuments, public edifices, historical localities, celebrated men.

Administrations of the province. Government presiding over it.

2*nd Class.*—Pass from the province to the State.

Italy: physical geography; agricultural and industrial products; ways of communication. Commerce. Very summary notions on the political and administrative geography of the kingdom.

3rd. Normal Course.

1*st Class.*—The earth, its form. Longitude and latitude. Particular description of Italy. Brief elementary notions on the other states of Europe.

Cartographical exercises.

2*nd Class.*—Particular description of each of the states of Europe. General summary notions regarding the other divisions of the globe.

Cartographical exercises.

Elementary notions of cosmography and of terrestrial physics. The earth considered as a planet. The solar system. Diurnal and annual movement.

Didactic method for teaching geography in the elementary schools.

3*rd Class.*—Particular study of the principal states of Asia, Africa, the two Americas, and Oceania. Ethnographic notions; races, languages, religions, habits, and morals.

Much more detailed study of the earth. The solar system and cosmographic notions. The universe.

Didactic method for teaching geography in the elementary classes.

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## W.

### THE POSITION OF GEOGRAPHY IN THE CANTON OF GENEVA.

By Professor P. Chaix.

Geography is taught in all our schools, and is compulsory in all the forms where it is taught.

Two hours every week in the four lower forms of the classical college; stopped in the next (middle) one and in the two upper forms. The subject has been reduced of late to very meagre *notions* of ancient geography, connected with the historical and classical fields, involving neither examinations nor any trial at the end of the year. About twenty years ago I was entrusted with a course of lectures on Ancient

Geography, covering the whole field, during the two years, two hours a week, and gave very satisfactory results. That course was first (after the revolution) transferred from myself to the head classical master, who gave to the branch any time he pleased, and it is now altogether put aside.

In the non-classical college the study of geography is kept up two hours a week during the six forms, and is, since my retirement from the two upper forms, given by my successor in a very complete manner on commercial and physical geography, followed by cosmography, limited to the earth, its motions, and the solar system.

In the secondary school for girls, geography is taught in all the forms. In the uppermost there was a very limited lesson, of but one hour a week, which I was compelled to alter every year, alternating one year with cosmography, and another with physical geography, which was attended to by the pupils in a way that allowed me to treat it in a superior manner. But since my retirement, cosmography is the only branch studied, and physical geography altogether set aside.

In the Gymnasium I was entrusted for one hour a week with a course of lectures on Physical Geography, which I was compelled to give on a much lower scale than with the young ladies, the pupils being far worse prepared by their masters in the two upper forms of the college than the young ladies are by their mistresses at the secondary school above named. That lecture is no longer given since my retirement from the Gymnasium.

In the commercial branch of the Gymnasium I used to give two hours a week, a course of lectures on Commercial Geography, to which I was at liberty to give considerable detail, and which has been kept up in a very able manner by my young successor, M. W. Roster, physical geography remaining suppressed.

The direction of the University have thought it proper to exclude both history and geography from the field of the examination which the pupils have to undergo in their passage from the Gymnasium to the University, in order to obtain their diploma for the Baccalaureat. But the disposition of the pupils was so exemplary at the Gymnasium that my teaching of the two above-named branches did not feel the blow as might have been expected.

In the University elementary astronomy and meteorology were the field of the late able Professor Émile Plantamour; but his lectures were limited to one semestral course.

There is but one separate master left, and with a very limited field, namely, my successor in the upper two forms of the Commercial College, and the same at the Commercial Gymnasium—besides one hour given by Professor Bertrand for cosmography at the school for young ladies. Historical geography is taught nowhere, historical associations being especially set aside by the schoolmasters. Of physical geography there is no other teaching than the above-mentioned, the title being applied without the thing at the College.

The field covered.—Generally Europe in two years, and the other portions of the world in two more, but with scarcely any interesting particulars, as I have seen copies of my Handbook completely maimed, under the direction of some of the masters, by cuttings which reduce it to a mere uninteresting skeleton.

*Notions* at random have taken the place of regular extensive teaching of ancient geography.

## X.

## GEOGRAPHICAL PROGRAMME OF THE "ATHÉNÉES ROYAUX" IN BELGIUM.

*Seventh Class.*

The teaching of geography in the Seventh Class is intended only as a preparation for the geographical course properly so called.

It will consist of a short *descriptive* course, a great geographical promenade, a kind of *tour of the world in forty lessons* (one hour per week). The teacher will start with Belgium, giving a short summary description of this country, and then introduce the pupils to the great states of Europe, whence he will pass with them to Africa, Asia, Australia, the Pacific Ocean, America, and the Atlantic Ocean.

In making this tour the teacher will take occasion to direct the minds of the pupils to the rotation of the earth, and the difference of climates, vegetations, animals, and peoples, without, of course, observing the scientific precision which would be required in a strict plan of study.

*Sixth Class.*

Preliminaries of geography.

General geography of Europe.

The *preliminaries*, which will be concerned in explaining terms and various conceptions in astronomical, physical, and political geography, will afford the teacher an opportunity of utilising and methodically classifying the greater part of the ideas, gathered by the pupils during the descriptive course given in the Seventh Class.

Then follows the study of Europe. This will comprise a short physical description, succeeded by the study of each of the political divisions of Europe, among which Belgium will be reviewed more fully than any of the other countries. For each country a summary will be given of the physical geography, then the situation, divisions, principal towns, with some ideas of the industry and commerce.

This course will extend over forty lessons of one hour each weekly.

*Fifth Class.*

Rapid repetition of the programme of the foregoing class.

General geography: Asia, Africa, America, and Oceania.

In treating each division of the world, a short general physical description will first be given; then a few conceptions regarding its political geography, more briefly, however, than in the case of the European countries.

Forty lessons at least for this course, one hour weekly.

*Fourth Class.*

General geography: The earth considered as a whole.

Detailed geography of Belgium.

The object to be aimed at in this course is to gather up into a general *unity*, and complete the geographical facts observed by the pupils regarding each of the divisions of the world. It will comprise general notions: (1) of astronomical geography (diurnal and annual movement, day and night, the seasons, the earth in the Solar system); (2) of physical geography (distribution and general [illegible] of the lands and oceans, oceanic basins, oceanic currents, trade winds, [illegible]ribution of the three kingdoms and [illegible]n races); (3) of [illegible] states).

This summary of universal geography is but the *résumé* and methodic development of the short descriptive course of the Seventh Class.

This course will conclude with a study of Belgium more complete and detailed than in the plan of the Sixth Class.

*Third Class.*

Preliminaries and general facts.

Detailed geography of Europe.

This programme (1) resumes and completes the preliminary theoretical conceptions communicated in the sixth course. It also recalls some of the general facts imparted in the fourth course (distribution of lands and oceans, currents, trade-winds, &c.). (2) It gives a detailed representation of Europe physically and politically.

The relative importance of the two parts of this programme may be inferred from the comparative limits of time to be given them.

Ten lessons for the preliminaries; thirty lessons for Europe.

*Second Class.*

Rapid repetition of the principal parts of the programme in the preceding class.

Detailed geography of Asia, Africa, America, and Oceania.

Each of these parts of the world will comprise (1) a complete physical description; (2) a particular description of each country, but less fully than in the case of the European countries.

Forty lessons (1 hour weekly).

*Rhetoric Class.*

The earth considered as a whole (astronomical, physical, political, and economical).

Very detailed geography of Belgium.

This programme is the scientific development of that of the fourth class.

1st. Under the general title "the Earth" are comprised the prescriptions in the present programme of rhetoric.

(*a*) *Astronomical*, including the elements of terrestrial astronomy, which are to be taught by the professor of geography, seeing that these elements often serve to explain the physical order of the earth, and that they logically form the scientific crown of a knowledge of the earth.

(*b*) *Physical*, including a recapitulation of the general facts.

(*c*) *Political*, setting forth the theoretical elements of the power of a state; recalling the great states of the world, in particular those of Europe and the European Colonies, &c.

2. The geography of Belgium closes the study of the earth. It should be as detailed a study of the country as possible, in its historical, physical, topographical, industrial, and commercial aspects, with a comprehension of its political and administrative institutions.

The lessons will be distributed pretty equally between these two parts of the programme, from forty to eighty, 1 hour per week.

## Y.

### THE METHODS AND IMPORTANCE OF GEOGRAPHICAL INSTRUCTION IN THE UNIVERSITIES AND SCHOOLS OF SPAIN.

Under the influence of the French legislation, which is imitated in Spain in many points, the teaching of geography is widely diffused in Spain.

By virtue of the Law of Public Instruction of 1857 geography was taught from a historical point of view in the faculties of letters. In 1880 the programme of 1857 was abolished, and a course of universal history was enlarged so as to give prominence to both history and geography, which are really inseparable.

In the school specially designed for the training of keepers of archives, public libraries and antiquities, the course of instruction in which lasts three years, one lesson daily is given in historical geography.

In the faculties of sciences geography is studied in so far as it is related to cosmography and geology.

In the commercial course, lasting three years, in connection with secondary instruction, a single course of two lessons a week are given in geography and statistics.

Commercial geography is one of the subjects of the examination which has to be passed by candidates in order to obtain admission to the body of Custom-house officers.

Aspirants to the diplomatic career require to show a knowledge of geography (how much is not stated).

The entrance examination to the General Military Academy, which imparts the instruction necessary before a candidate can become an officer, includes the elements of geography; and the programme of the Academy, which extends over three years, comprises a course of studies in the military geography of Spain.

In the special academy of the general's staff, where the officers remain three years, 88 lectures are given in the military geography of Spain, and 60 in universal geography.

In the special academy for military engineers, the course of instruction in which lasts five years, 15 lessons are given in the fourth course on the military geography of Spain and Europe.

In the Academy of Military Administration (of the same character as the academy above mentioned), and where the curriculum of study extends over two and a-half years, there is an alternative course called "Economico-Military Geography of Spain."

In the academy of the cavalry service of the army, with a curriculum of three years, there is a daily lesson throughout one session on the military geography of Spain, Portugal, and the Franco-Spanish frontier.

In the Institutes of Secondary Instruction, with a programme of six years, lessons are given daily in geography before the pupils enter on the study of history, and before they are supposed to know anything of the natural sciences.

In the programme of primary instruction is a course in "Nociones de Geografia, especialmente de España."

The maps of Levasseur are beginning to find a larger public among us, and in some establishments the maps of E. Sydow, the hypsometric charts of the Institute of the Brothers of the Christian Schools, and those of Suzanne, are known and used.

The best wall-maps of Spain are those of the War Office, on the scale of 1 : 500,000.

For the pupils' own use, C. Vogel's 'Spanien und Portugal in vier Blättern,' is much in requisition.

Of an analogous character is the excellent work, just published, by General Hañez, Director of the Geographical and Statistical Institute, on the scale of 1 : 1,500,000, and in which the Peninsula is divided into military zones.

The German atlases, and particularly the 'Volksschul-Atlas' of Dr. Richard Andrée, are in great repute.

For the teaching of historical geography, Kiepert's 'Atlas Antiquus,' Carl Wolff's historical atlas, Kiepert's wall-maps and Spruner-Menke's large atlas are used.

The examinations in geography, as in any of the other branches, are, according to the prevailing system in Spain, independent, and the results are determined quite apart from those obtained in the other subjects. In the military academies, failure in geography, as in any other department, involves a repetition of the course.

The emoluments obtained by the special professor of geography are equal to those given to the professor of any other chair.

The scientific works in geography executed in Spain refer very especially to the *descriptive* part (and so scarcely scientific at all): atlas of D. Francisco Coello, the publications of the Geographical and Statistical Institute and of the "Direccion de Hidrografia."

A tendency is now manifesting itself to bring geography into relation with geology, so as to refer the facts of geography to their causes and general laws, and in response to this sentiment various treatises by the naturalist Macpherson, Professor G. de Linares, and Vilanova, and Botella, have been published in the 'Revista de España,' and the 'Boletin de la Sociedad Geográfica de Madrid.'

In the legislative sphere, also, the same principle has asserted itself by some recent enactments (such as the Royal Decree of the 17th March, 1882) in which, on the plan of studies, geography is incorporated with the natural sciences.

In the majority of the establishments for secondary education and of the normal schools for primary instruction, the descriptive part of geography holds a far more important place than the general, historical, and economical aspects.

Levasseur's books on economical geography, however, are exercising an influence among us, and teachers, without giving special instruction on economical geography, qualify the teaching of other parts of geography by the knowledge they derive from Levasseur.

The 'Institucion libre de Enseñanza,' to which we owe the reform of primary education, has introduced new methods of teaching geography; taking topographies, studying the town, making excursions to the neighbourhood, constructing reliefs in scales and curves of level on maps, making geographical models, as a means of analysing the orography, tracing and drawing of maps, &c.

Such teaching bears among us the character of genuine education. By such travels and excursions the pupils are brought to realise personally a large number of geographical conceptions and details which are thus more precisely impressed on them by drawings, itineraries, &c. "By the development which the system of excursions has gained a good number ('buen número') of pupils of secondary instruction know a large part of Spain and have been able to appreciate personally the various characters of the different regions of the Peninsula."

With the object of promoting this system of personal practical geography the examination papers and geographical works (such as those of Prof. Cossio) put

questions involving the calculation of distances, the drawing up of itineraries, and the study of maps.

To teach the reading of maps and to give the pupils a proper appreciation of the signs of the planimetre and of reliefs, maps of the environs and immediate district are supplied. These maps are taken in all the walks and excursions of the pupils, and the places the pupils have immediately in view are compared with the delineations of them in the maps.

In some institutions there is a course of geographical instruction on the modern basis, teaching the marking of topographies, the construction of reliefs, the tracing of maps, geographical modelling.

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## Z.

## LETTER FROM Mr. JAMES BRYCE, M.P., ON THE FIELD OF GEOGRAPHY AS A UNIVERSITY SUBJECT.

Every one who is interested in the development of University teaching, and in the success of the endeavours made to keep it abreast of the needs of our time, will be glad to hear that the Geographical Society proposes to urge on the governing bodies of Oxford and Cambridge the importance of providing for systematic instruction in Geography. Nor will any persons feel this more strongly than those who are concerned with the study of History.

Geography is one of the two chief subjects in which the sciences of nature and the sciences of man touch one another. It has accordingly two sides or aspects, the physical and the human,—the investigation of our globe as the result of physical forces, and the description of it as modified by the presence and action of men. The latter of these is the necessary pre-requisite of history, and cannot be comprehended apart from the former. Whether we regard the general stream of history from the days earlier even than tradition, and the causes which have distributed and differentiated the races of mankind; or whether we pursue the narrative of events in each particular country, observing the influences which have moulded the character of its inhabitants, which have isolated some peoples and enabled others to influence their neighbours, which have raised some to empire and condemned others to subjection, which have determined the lines of commerce and the course of migrations, we find a comprehension of the natural forces at work to be indispensable to a mastery of the results. All this is now so fully admitted that one need not enlarge upon it. Every competent lecturer on history recognises the importance of calling the attention of his hearers to the physical conditions under which the events he describes were enacted, and will frequently recur to these conditions in the progress of the narrative.

But it may be doubted whether teachers of history have at present adequate means of themselves obtaining that systematic scientific instruction which they need in order to master the subject. They have to pick up their knowledge from books seldom written with a view to history, and often presupposing an amount of general scientific training which they do not possess. One may therefore believe that both teachers and the more advanced students of history would largely profit by the establishment of a Chair of Geography, one of whose main functions would be to treat of the physical features of the world, and especially of the dwelling-places of the great civilized races as *præcognoscenda* for history.

With respect to other classes of students it must be admitted that Descriptive and Political Geography are neither subjects of the first importance, nor specially fitted for treatment by oral lecturing. There is, however, as regards Physical Geography, a particular line of usefulness for others than historians which I should like to urge. Nearly everybody now travels, and an increasingly large number of persons travel far from home, in countries whose physical conditions differ considerably from those of England. Such persons lose a great deal both of the pleasure and the profit of travelling if they remain ignorant of the elements of physical geography, particularly in so far as it deals with the configuration of a country by mountain chains and river valleys, with the phenomena of winds and rain, with the distribution of animals and plants. It is hard to find time at the Universities for a thorough study of geology, botany, and meteorology; but even to have had one's attention called to some of the leading principles of these sciences, and to have formed the habit of observing the facts they deal with, is a great gain to a traveller. Elementary knowledge is one thing, superficiality is another. A good teacher of physical geography might, I think, greatly interest and stimulate young men by pointing out to them how and what to observe, and indicating the relations of the various sciences of observation to one another.

Whether the present system of University Examinations leaves any room for such teaching is another question. Perhaps it does not. But this system will not last for ever.

To the practical enquiry how geographical study can be advanced at the two great English Universities, I should answer: Not by founding scholarships or prizes, for of these Oxford and Cambridge have enough already; not by establishing a new examination, nor by giving geography a larger place in the existing examinations, for these examinations are already too numerous and too heavy. There remains the creation of a professorship or of occasional lecture courses. I have referred above to some of the reasons which dispose one to believe that either of these might be valuable, but it would be essential to provide as lecturer a person of the highest gifts, who would treat physical

geography in a large and fresh way, bringing out its relations to the other sciences. And the historical aspects of the subject could not be worthily treated except by an accomplished historian, who had studied the history of the great nations in their several homes, and could therefore give something not to be found in the ordinary books.

J. BRYCE.

JULY 3RD, 1885.

THE

# CADASTRAL SURVEY OF INDIA.

BY

LIEUT.-COL. W. BARRON, B.S.C,
DEPUTY SUPERINTENDENT, SURVEY OF INDIA.

READ IN THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION, ABERDEEN, SEPTEMBER 14, 1885.

# THE CADASTRAL SURVEY OF INDIA.

By Lieut.-Col. W. Barron, Bengal Staff Corps.

(Read in the Geographical Section of the British Association, Aberdeen, Sept. 14, 1885.)

Geographical researches, undertaken for the purpose of exploring and mapping new and unknown countries, have always had a charm, which leads men to encounter great hardships in overcoming the difficulties connected with their explorations.

A great work, like the Trigonometrical Survey of India, is also interesting in itself, apart from the actual objects for which it was undertaken, and the benefits it has conferred on science. The surveying and mapping of such an extensive and varied country as India will possess an interest for different individuals according as they read or hear of the surveyor delineating the vast mountain chains of the Himalayas and of India proper, or the no less varied plains where the village lands and the rights of the cultivators engage his attention.

But there is no doubt that the romance of surveying is greater when we are following the routes of the various explorers who have been sent into Central Asia to lift the veil of hitherto unknown regions, and when we are hearing accounts of survey parties with armies in the field, or with boundary commissions, than when we have merely the record of every-day survey routine in the prosecution of peaceful operations undertaken by the Government in the interest of the hard-working cultivators of the plains of India.

The tent of the Indian surveyor is found everywhere, on the dry and sandy plains where vegetation is at a minimum, on the fertile tracts where twice a year the face of nature is covered with a bountiful harvest, and in the dense jungles of Burmah and Assam, where rank vegetation does battle with the pioneers of civilization, and the surveyor has to tunnel his way through forests so dense and tangled that the rays of the sun hardly penetrate to the cutting which he is obliged to make for his theodolite and chain.

The climate, too, in which he works varies from the tropical heat of Southern and Central India, and the scorching dry hot blasts from deserts and sandy plains, to the damp malarious steam of sub-mountainous regions, the freezing temperature of the Himalayas, and the tracts of perpetual snows.

But under all these varied conditions the surveyor is found at his

task, the European and Indian working together side by side, gradually accumulating the materials for filling up blanks in the atlas of India and the map of Asia, or preparing in greater detail the village maps and papers on which such a large portion of the Revenue of India depends, and on which hang the welfare and prosperity of so many of our dusky fellow-subjects.

In a vast country like India, which contains more than 250 millions of inhabitants, more than a million and a half of square miles, and is more than twelve times the size of the British Isles, it may be imagined that surveying is carried on under many various conditions, and that the minuteness and degree of accuracy of the survey will vary according to the purposes for which it is intended, or the amount of money that can be spent on it.

We find, therefore, that surveys are executed on different scales. In some native states and in barren hills and jungle tracts, where the primary object is to prepare a reliable map of the country, the topographical surveyor works on the scale of half an inch or an inch to the mile; in more open country, or where a more accurate survey is required, the scale of the topographical survey is two inches to a mile. In such surveys the boundaries of only the large divisions of the country are delineated, such as of districts and native states.

The next larger scale is four inches to a mile, and surveys on this scale are called Revenue Surveys, because they are connected with the settlement of the Land Revenue. They are undertaken with the object of accurately defining the Revenue divisions of districts, the village boundaries, and the village lands, and for giving accurate areas of these lands, and the detailed acreage of cultivation, fallow, fit for cultivation and waste. These areas were used as checks on the results obtained by the operations of the unprofessional surveys carried on by the Settlement Department.

These four-inch-to-a-mile surveys are now being given up, and their place taken by surveys on the next larger scale—namely, sixteen inches to a mile; and this is the standard scale of the cadastral survey of India, which with its objects will be described in this paper.

When the lands of a village are very minutely sub-divided it becomes necessary to increase the scale of survey to 32 inches to a mile; but this has not been often found necessary in the North-West Provinces, where cadastral operations have been chiefly carried on.

In some small portions surveyed in Bengal the 32-inch scale had to be used, and when the whole of Bengal comes to be cadastrally surveyed the larger scale will have to be adopted in many villages, the sub-division of fields being so minute.

There are also surveys on larger scales of cities, towns, and harbours. These vary from 64 to 80 and 120 inches to a mile or more, according to circumstances and the objects for which the survey is required.

In the Report of the operations of the Survey of India for the year 1882–83 the areas surveyed under the different scales were as follows:—

| | | |
|---|---|---|
| ½ inch scale | . . . . | 7384 sq. miles. |
| 1 „ | . . . . | 7989 „ |
| 2 „ | . . . . | 9328 „ |
| 4 „ | . . . . | 2390 „ |
| 16 „ | . . . . | 3287 „ |
| various other scales | . . . | 145 „ |
| Total | . . | 30,525 „ |

The large scale surveys undertaken in India in recent years have been designated Cadastral Surveys, from the French word "cadastre," which is derived from "capitastrum," a register for taxation—from "caput," the head; and which means a survey giving an outline descriptive map, showing the different properties of a district, with other statistical information as regards the rights of landlords and cultivators.

In India the Government for the time being is primarily the superior of the soil, and the rights of the Government as the superior landlord have been recognised in all ages, and throughout the successive waves of conquest that have swept over the land. Hence, when the British became superior in Hindustan, the land became its property, and from it the largest item in the Indian Revenue is derived.

The land revenue in the shape of direct or indirect rents from the soil amounts to about 22½ millions of pounds in an annual budget of 52 millions, or about three-sevenths of the income, and after the cost of collection, about 3½ millions, is deducted, there remains a balance of about 19 millions net revenue from land.

Under the former rulers of India the land revenue or rent used to be put at half the gross outturn of the land, speaking in general terms. Under our Government the assessment consists of half the gross declared and attested rent-roll, that is in districts not under the permanent settlement; but the Government demand varies according to the condition of the land and the people.

In former times the land revenue used to be farmed out to headmen, successful generals, or court favourites, who, after paying the Government demand, got as much else out of the cultivators as they could. Sometimes, when these headmen increased in riches too much, they were conveniently suspected or accused of treason, and, being put out of the way, their ill-gotten gains became the property of the State.

Some of the large farmers of revenue, who had, as it were, become hereditary landlords, were continued as such by the British Government, and are now native noblemen, maharajahs, or zamindars (*i.e.* landlords), holding their lands from Government under payment of a yearly rent. Lately in Oudh several of the old farmers of revenue have been elevated

into the status of hereditary zamindars under the title of talukdars—taluk meaning an estate consisting of a group of villages, of which the talukdar is the superior proprietor.

Besides the rents paid by these zamindars there are several other ways in which the land revenue is collected. In Bombay the settlement is made with the tenant direct. There the land is divided by Government survey into different sized fields, according to the crop that can be cultivated on it, or to the amount that can be worked by one or more pairs of bullocks. A tenant, or partnership of tenants, takes the field and pays the Government demand, the same way as a farm might be leased here, but the lease is only for the year, and in case the rent is not paid the field is resumed by Government, and let to some other tenant. This is called the Ryotwari system of tenure, from the word ryot, a tenant.

In other cases a headman, or the headmen of the village, undertake to pay the revenue. The settlement is made with them, and they portion out their share of the Government demand, according to their shares in the village lands. They rent out the fields to the village community, receiving a portion of the rent for their trouble. They also receive a reduction of 25 per cent. on the rent of the lands cultivated by themselves or on their "home-farms." This is called the "Lambardari" system, from "lambardar," the name of the headmen. This word is a corruption of the English word "number," *i.e.* the "numberer."

The headmen of a village have generally hereditary rights in the village soil, and may be styled the landlords. The village lands are either held in common by them, the produce being divided according to their several shares, or they are divided off into portions according to the shares of the headmen, in which case each collects the rents from his own tenants, but all are jointly and severally held liable to the Government for the rent of the village, if they have accepted the settlement and agreed to pay the Government demand. The lambardars thus become a sort of middlemen between the Government and the tenant.

Under the different methods of collecting the revenue that prevail in different parts of the country, and owing to the ancient patriarchal system by which property in land has become subdivided among members of a family, this subdivision in most cases being very minute, it may well be imagined that the administration of the land revenue of India is a complicated problem, and that before it can be successfully carried out, so that each individual tenant shall pay no more or no less than his proper share, it is absolutely necessary to ascertain the area of each man's individual holding, the rights of the landlord and tenant in that holding, the nature of the soil, the crops grown, the methods of irrigation, the value of the crops, and other information, so that the Government demand may be apportioned equitably over all. Such

an enquiry and assessing of land revenue is called a "Survey and Settlement."

In the Bengal Presidency, which includes Bengal Proper, the North-West Provinces and Oudh, the Punjab, the Central Provinces, Assam and Burmah, there are several methods of assessing the Government demand, namely, the permanent settlement introduced by Lord Cornwallis at the end of last century, and by which the land revenue was fixed in perpetuity; the thirty years' settlement, in which the land is revalued after each thirty years, and the demand adjusted accordingly; the five to ten years' settlement of lands in river beds subject to changes from river action; and the yearly fluctuating demand in Assam and Burmah, where rent is paid on the amount under cultivation for the year.

The permanent settlement extends to Bengal Proper and to four districts of the North-West Provinces. While the latter were under settlement, Lord Cornwallis died, and the system was dropped, much to the advantage of Government, because, when the permanent settlement was made, the country was in a backward state, and the land in Bengal was consequently let at very much less than its value. At present Bengal contributes only three or four millions of land revenue when it should, as it is said, be giving about twelve. This is owing to the rise in price of crops, to the opening out of roads, railways, canals, and other Government and private works, and the profits of this increase in value go to the zamindars, and do not benefit the tenants in the way contemplated by Lord Cornwallis.

The Bengal Rent Bill, about which so much discussion has been going on in India, and which has lately been passed, is intended to remedy some of the defects of the permanent settlement, and notably to secure to the tenants some of the rights intended for them by it.

In districts under the thirty years' leases, when that period has about expired, the Government appoint settlement officers, whose duty it is to prepare village maps, with a record of rights of landlords and tenants to measure each field, to find out the value of the produce, and assess the Government demand on the village.

Under the Native Governments that preceded ours village maps did not exist. During our first settlements very little attempt was made to obtain accurate maps, but an endeavour was made to ascertain with some degree of accuracy the areas of fields. This was done by measuring the lengths of their sides, taking an average of the length of the field, and multiplying it by the average breadth for the area. The measurements were carried on according to whatever standard prevailed in the group of villages under survey, and they were made with a stick or a rope which, not being compared with any standard other perhaps than the length of the forearm, varied considerably in different villages.

The maps also were mere eye-sketches, in fact they served only as

showing the numbers given to the fields, and as an index to the record of areas, but at first no attempt was made to plot the fields in their proper place and shape. The map was made up by hanging these imaginary fields one on the other, and the shape of the village boundary was left to take care of itself. In some parts of Bengal at the present day this is the only sort of village map that exists.

A great improvement was made by more accurately surveying the fields, by ascertaining the general direction of a side by magnetic bearings, and plotting the fields by scale and compass from these elements. The fields were now as far as possible put into their places, but as they were built up one on another, some got crowded out, and the village boundary was inaccurate.

Another improvement was the introduction of a sort of survey based on triangles and by subdivision of the area of the village, so as to attain a greater standard of accuracy; but all these methods left a great deal to be desired, and as they were carried out by a staff of native measurers working under a settlement officer, who was not a professional surveyor and who had very little time, on account of his other duties, to superintend the measurements, the result was not up to the requirements of the times.

During all this time the professional surveys were used as checks on the settlement measurements. At first the surveyors were employed in making an accurate survey of the boundaries only of villages, calculating the gross area within these boundaries, and preparing skeleton maps of the villages and district showing boundaries only.

The survey areas of the villages were made over to the settlement officers as a check on the areas produced by their measurements.

The old professional maps of Bengal and the North-West Provinces therefore consist of boundaries only, with perhaps the village site marked, and in many parts the district maps at the present day are such skeletons. They were prepared on the scale of four inches to a mile.

Subsequently the professional surveyors surveyed the interior lands of the villages, giving the cultivation and waste in block without distinguishing fields, but surveying the village sites, streams, roads, and all other topographical features. The areas of all these items were separately abstracted and made over to the settlement officer to check his areas. But really this was of little use, and there was the spectacle of a non-professional survey measuring inaccurately, while a department of professional surveyors was kept at work to show how far the other was in error, and also to resurvey the district under settlement for the purpose of preparing village and district maps, which could not be compiled from the settlement surveys.

It had long been considered by several officers engaged in these Revenue surveys that a great deal of survey power and money was being

wasted, and that the full benefit was not derived from the existence of the professional survey staff, and the question had been often mooted of the survey department making the field by field measurements instead of the settlement keeping a staff for that purpose.

At length, in 1870–71, when several districts of the North-West Provinces were about to come under resettlement at the thirty years' period, a conference of settlement and survey officers assembled at Naini Tal, under the orders of Sir William Muir, then Lieutenant-Governor of the North-West Provinces, and it was resolved that the survey staff of the settlement department should be made over to the professional survey, that the latter should be responsible for the survey of the fields, and should render to the settlement village maps on the scale of 16 inches to a mile, showing correct boundaries of each village and of each field, the latter being numbered, and the correct area of each entered under its proper number and heading in the several columns of the village record-of-rights, for which the survey was to be responsible as regards the areas only.

This was the introduction of the cadastral survey, as it is called, into India, and that country is indebted to the enlightened policy of the Government of the North-West Provinces for inaugurating and supporting a system whereby correct village maps and field areas are now produced, and the survey department is fully utilized, while the settlement officer is relieved of his measuring establishment and work, which he was unable properly to superintend in the midst of the many other harassing duties connected with his settlement operations, and is able to devote his time to directing and supervising the work that properly belongs to his department.

When the professional survey began the field measurements, the native measurers called "Amins," who had been employed by the settlement department, were taken over and trained to produce more accurate work, and several modifications were introduced in the records and mode of surveying to ensure both accuracy and speed.

In the village record book called the "Khasra" there were three or four columns relating to the names of landlords and tenants, the nature of their tenures, and the kinds of soil, which were not at first filled in by the survey, as it was considered by settlement officers to be the peculiar duty of their department to find out and record the entries in these columns. This necessitated a settlement staff going again over every field mapped by the survey—and often after the lapse of a year or two, when the nature of the cultivation had changed—to fill in information which some survey officers considered they could easily obtain and register at the time of survey, and that by so doing they would much cheapen the cost of the settlement, and prevent the villagers from having to waste time in going twice over the same ground.

The plan of the survey filling in these columns, and also preparing

the rent-rolls, was begun experimentally in the year 1881–82 by the survey and settlement officers in Mirzapur, one of the permanently settled districts of the North-West Provinces, where a new record-of-rights was being prepared. Next year it was introduced by the survey and settlement officers in the Benares district, with some modifications ensuring closer and quicker working between the two departments, and thereby shortening very materially the time taken up in survey and settlement operations.

After a few months' experience it was found that the survey could collect and record the information required by the settlement, and a conference was called at Benares in January, 1883, by Sir Alfred Lyall, Lieutenant-Governor of the North-West Provinces, at which the opinions of the settlement and survey officers engaged in these operations were heard, and it was determined that for the future the work of collecting the information for the record-of-rights should devolve on the survey, but all disputes that might arise between landlords and tenants should be decided by the settlement officer.

Hitherto the combined operations had been carried on in the permanently settled districts of Mirzapur and Benares, two of the four districts of the North-West Provinces which were before mentioned as under settlement at the death of Lord Cornwallis; but there were two large districts, Gorakhpur and Basti, about to come under the thirty years' settlement, and these had improved so much in cultivation during the term about to expire, and were likely to be so much more valuable still owing to the opening out of a railway through them, that it was determined to bring them under resurvey and settlement.

These operations are now in progress, and the survey has been able still further to assist the settlement by recording the nature of the soils, by preparing maps showing their distribution, and by abstracting and tabulating regarding the cultivators, the tenures, the crops, the castes, the rents, &c., statistical papers which greatly facilitate the labours of the settlement officer, and reduce the cost of his operations, without adding much to the cost of the survey, but of course increasing greatly the labour and responsibility of the survey staff.

For administrative and revenue purposes India is divided off into districts. In the North-West Provinces there are 37 of these, each containing an average area of about 2340 square miles, and a population of over one million, and each is under the control of an officer called a collector, a name derived from his duties in collecting the land revenue. Assistant collectors, both European and native, assist him in administrating the law, collecting the revenue, and deciding all cases that arise in connection therewith.

The districts are subdivided into portions called tahsils, which are under native revenue officials called tahsildars. The tahsils are subdivided into portions called parganas, two or more of which form the

tahsil. The parganas are again subdivided into portions called "mauzas" or villages.

As compared with this country, a district would correspond to a county, a pargana to a district lying within that county, and a village would be the same as a parish. The term "mauza," or village, includes both the village site and the land cultivated by the community living in that village, and it is a portion of the surface of the country permanently divided off and defined by boundary marks.

The lands of the village are subdivided into "fields," which are the portions of land separately held by one or more cultivators on the same cultivating tenure, and owned by one or more proprietors under the same proprietary tenure. The total area of the fields belonging to a tenant makes up his holding or farm, and these fields may be either adjacent to each other, or they are most commonly scattered all over the village, so that he may have his share of the good and bad land.

The "field" is the unit of survey, and the object is to ascertain the individual area of each field, its crop, its soil, its ownership and tenantship, and to record the information in a permanent form, which then becomes the village record-of-rights.

The system pursued by the survey to work down to the field, to map it in its proper position on the village map, and to fix these villages in their true places on the map of India, is as follows:—

The great trigonometrical survey has covered the plains and mountains of India with a network of triangulation. The stations of this survey are fixed to the 100th part of a second of latitude and longitude, or to the decimal part of a foot. On these stations is based the work of all the other professional surveys in India, and each piece is fitted into its place and kept there by rigid calculations derived from the latitudes and longitudes of the great trigonometrical survey.

When a district is made over for survey to a revenue or cadastral surveyor, he selects the point of intersection of some degree or quarter degree of latitude and longitude, which falls nearest the middle of the district. This point he calls the "origin of survey," and to it he refers all his measurements. From this point the distances to the great trigonometrical stations lying in his work are calculated. He commences his survey operations by measuring, by chain and theodolite, a series of lines and angles round a block of villages, which he calls a main circuit. This varies in area from 100 to 300 square miles, and includes one or more parganas or other divisions. The direction of each measured line is referred to the north, by bearings deduced from star observations at certain intervals. As every line that does not lie either due north, south, east, or west, must lie in two directions between these points, *i.e.* N.E., S.E., S.W., or N.W., it is evident that the direction of each line, with four exceptions, can be resolved into two at right angles to each other, and it is also evident that if the surveyor measures round his

circuit, when he returns to his starting point, he will have gone as far north as he has gone south, and as far east as he has gone west. All the measured lines of the circuit are resolved by means of the cosines and sines of the bearings into four directions, north, south, east, and west; their lengths as so obtained are tabulated under these four headings, and if the work is correct the sum of the northing is equal to the sum of the southing, and that of the easting to the westing. The observed angles are checked by the theorem that the sum of all the interior angles of a polygon, together with four right angles, are equal to twice as many right angles as the figure has sides. Any error found in the angles or lines is at once remedied by re-measurement, and in the case of main circuits the lines are double chained in the first instance to prevent mistakes. Some of the stations of the main circuit are connected by observations to the stations of the trigonometrical survey, whose distances from the origin of survey have been calculated, and hence, by simple addition and subtraction of the resolved distances of the measured lines, the co-ordinate distances from the origin of all the stations on the main circuit are deduced.

Within the main circuit, smaller circuits are made, and again within these a series of lines and angles is surveyed round the boundary of each village. These are all proved and treated in the same way as the main circuit, and every station is marked by a stone set in the ground.

We have at last a number of stations permanently marked on the boundary of each village, and fixed by a record of their distances from known points, hence their positions can be plotted on paper to any scale. This is done by drawing rectangular co-ordinate lines at certain distances apart, and plotting the stations by scale and compass.

On the same rectangular co-ordinate lines, the stations of the great trigonometrical survey, and the intersections of the degrees of latitude and longitude, can be plotted from their calculated co-ordinate distances from the origin of survey, and hence the survey stations are fixed in their true positions, not only as regards each other, but also as regards their positions on the earth's surface.

By simple calculations during these processes the areas of the circuits and of each village are obtained. The sum of the areas of the villages within a small circuit must agree with its area, and the sum of the areas of the smaller circuits within a main circuit must agree with that area. Having so many checks on his work, the surveyor proceeds with confidence, and knows that his subsequent work is based on correctly fixed points and true areas.

When one portion of a district has been thus treated, another block of country adjacent to the last is enclosed by a circuit, and the process is repeated till the boundary of every village in the district is enclosed by a series of stations and lines.

The stations and lines round a village block are plotted on a sheet of

paper to the scale of survey. The sheet is made over to a native surveyor, together with a duplicate copy on rough paper, on which he records certain measurements. He proceeds to the village with his chainmen, and, accompanied by the headmen of the village, goes round the boundary measuring by off-sets every turn and bend of it, recording the distances in a field-book, and plotting them on his sheet. While measuring along the plotted lines, he makes extra stations for his subsequent work, at every ten or twelve chains apart, and thus the village is surrounded at short intervals by fixed stations on which the field survey is based.

The surveyor then proceeds to divide the village lands into small blocks of ten to fifteen acres each by running lines across the village from and to fixed stations. He marks on the field boundaries the places where his chain crosses them, and these points being all plotted on his map, he has at last, distributed over the fields, a great number of stations from which the field boundaries are surveyed and plotted by short off-set measurements to their corners and bends. This system of survey has great advantages over the old method of building up a village field by field, for it proceeds on the reverse principle, and works down to the field from accurately plotted boundaries and fixed points.

When a field has been surveyed and plotted, the surveyor numbers it, and proceeds to write the record-of-rights, or the village "Khasra," regarding it, and enters its number in its proper rent-roll called "Jamabandi."

To be able to appreciate the amount of labour that is entailed in writing up these two records, it is necessary here to glance at the complicated system of proprietary and cultivating tenures that obtain in India.

The landlords, as I said before, are the resultant of numerous forces under different Governments and conquerors who have held the country. They may be descendants of men who took the land and held it with a strong hand during great social disturbances, or of successful generals and court favourites to whom tracts of land in newly-conquered territories were given, or of farmers of revenue to whom the Government has made over the land, or of servants of the State who have received grants of land for good service, or of headmen of villages whose claims to hereditary rights in the village lands have come down from the mists of antiquity, or they may be the more recent class of proprietors rapidly springing up who buy up land from impoverished landlords, and who under our settled rule find land investments profitable.

All, however, except those who have been elevated into the rank of independent princes, and those who hold their lands rent free, pay revenue to Government, and Government is the superior landlord.

The divisions of the shares in the land are numerous and very complicated. There are two principal modes of division. One is by the

factors of sixteen, corresponding to the sub-division of a rupee into sixteen annas and lower fractions; the other is by the factors of twenty, corresponding to the division of the measure of land called a "bigha" and its fractions. Thus, if a proprietor holds an anna or a biswa share in an estate he has a one-sixteenth or a one-twentieth share in it.

A single owner may possess absolute proprietary rights in an estate, or several persons may possess heritable and transferable properties in the same estate, and these may be in the shape of coparcenary rights, or of those of superior and inferior landlord.

Owing to the division of estates among members of a family coparcenary tenures are the most common, and embrace all cases where the lands are held by village communities. These tenures are of several varieties, but the most common are reducible to three heads.

First.—Those in which the whole land is held and managed in common. The rents paid by the cultivators, whether these cultivators be the proprietors themselves or not, are thrown into a common stock, with all other profits from the estate, and after deduction of expenses the balance is divided among the proprietors according to their shares. Second.—Those in which the village lands are divided off and held in severalty by the different proprietors, each person managing his own land, and paying his fixed share of the Government revenue, the whole being jointly responsible in the event of any one sharer being unable to fulfil his engagements. Third.—Those in which part of the land is held in common and part in severalty, the profits from the land held in common being first appropriated to the payment of the Government revenue and the village expenses, the surplus being distributed, or the deficiency made up according to a rate on the several holdings.

Many villages contain within their limits specimens of all these tenures in the several shares into which they are divided among several proprietors.

Before the village record-of-rights and rent-rolls are begun, a share list of proprietors is prepared by the settlement officer and made over to the surveyor. In this the shares of the proprietors are stated in fractions of a rupee or bigha, the nature of their tenures, the sub-divisions into which the village lands are divided and how they are held, together with a record of any person who may hold land rent free.

There being no law of primogeniture, and the land being divided according to the ancient custom among the children of a family, it has come to pass that the divisions of estates have been carried so far that in some cases a share is so small as to be hardly recognisable, and the trouble of collecting the revenue from such petty proprietors, whose shares payable to Government may be no more than a penny or less, is so great, that it is time further sub-division were stopped.

The occupancy or cultivating tenures are divided into three distinct classes.

First.—Tenants at fixed rents. These occur in permanently settled districts only, that is, in Bengal Proper and in four districts of the North-West Provinces. They may be defined in general terms as tenants who have held by themselves and their predecessors from the time of the permanent settlement land at the same rate of rent. Such tenants have a right to hold their fields, and cannot be ejected from them so long as they pay the fixed rents. Their rights devolve by succession or can be transferred.

Second.—Occupancy tenants. Every tenant who has actually occupied or cultivated land continuously for twelve years has a right of occupancy in that land, and the occupancy or cultivation of his father or the person from whom he inherits counts as his occupancy in establishing his rights. His occupancy of land belonging to another tenant under a lease does not confer an occupancy right. Among this class of tenants come proprietors who have sold their proprietary rights. They can retain the occupancy of their home farms at a rent 25 per cent. below the value of the land.

Third.—Tenants-at-will. These hold under a yearly lease, and have no rights extending beyond their year of cultivation.

There is also a class of sub-tenants whose names are entered in the record. These are non-proprietary cultivators who rent land belonging to proprietors or to tenants having occupancy rights.

The record-of-rights, therefore, for each estate contains a list of all the co-sharers, and of all other persons occupying any portion of the land therein, or who have any heritable or transferable interest in such land, or receive rent from it. It defines the nature and extent of the interest held by each co-sharer and other persons, and it gives the names of all persons holding land rent free.

It also specifies all persons holding land at a rent fixed by grant or by contract, or on condition of service, and all other tenants on the estate, their names, their castes, the areas of their holdings, and all conditions of their tenure, whether they be tenants at fixed rates, occupancy tenants, ex-proprietary tenants, or tenants without the rights of occupancy—if the latter, the number of years during which they have held the land is entered, because they may acquire the rights of occupancy if they hold their fields for twelve years—and all other conditions of tenure whether on lease or otherwise are recorded.

We now return to the surveyor. When he makes the entries in the records he is accompanied by the landlords and tenants, or their representatives, and by the village accountant, a native official called "patwari," who keeps the accounts, the rent-rolls, and the records of the village, in other words he is the "factor." While the surveyor writes up the record in the Persian character, the accountant at the same time prepares a duplicate copy in the Hindi character, and also writes the entries in the rent-rolls in Hindi. He supplies information

regarding the landlords and tenants from the village papers which he has with him. All the entries are read out, that those interested may raise any objection they see fit.

Each tenant is supplied with rent-roll slips, on which the numbers of his fields are entered when surveyed and numbered, and he has a separate slip for each landlord, and for each tenure under each landlord.

All the men being in attendance with their rent-roll slips, the surveyor when he has numbered a field asks whose it is. The tenant steps forward with his slip ready while the others stand round to hear, and the entries in the record-of-rights or khasra are proceeded with.

In column 1 are entered the number of the field, and, below this, its name if it has one.

In column 2 is entered the name of the division of the village in which the field lies, if the village is divided off among the landlords.

In the third column are entered the names of the proprietors, their fathers' names, their castes, their places of residence, and the amounts they own in the village, in parts of a rupee or bigha as the case may be. If the proprietor has mortgaged his property in the field, the name of the mortgagee is entered, with his description, the same as for the landlord.

In column 4 is written the name of the tenant, with his father's name, caste or race, place of residence, and the nature of his tenure of cultivation. If he is a tenant at fixed rates, who has transferable rights in the field, it must be ascertained if the field is mortgaged, and if so to whom, the mortgagee's name and description being entered; also if there are any sub-tenants, their names will be entered. If there are co-tenants in the field their shares are entered. In the case of tenants not at fixed rates, the time they have cultivated, the nature of their leases, and the changes therein, are all ascertained and written down.

The next two columns, 5 and 6, contain the area of the field in acres, as ascertained by survey, and in bighas, when converted into the native measurement. These are filled up in office.

In column 7 is entered a detail of how the field is irrigated. If irrigated from a canal it must be stated if it is by flush or lift, if from a pond or well the situation is stated. If the field depends on rain alone no entry is made; but if, from the lie of the ground, or the position of the field near probable sources of irrigation, it can be irrigated, this fact is to be stated.

Columns 8 and 9 relate to the autumn harvest called "Kharif." In the first of these the surveyor enters the name of the crop that was last grown, and, in case of more than one crop being grown in separate parts of a field, he states the proportions occupied by each. In the second of these columns the area of each crop is entered.

Columns 10 and 11 relate to the spring harvest called "Rabi," and the same information is given as was entered for the autumn harvest.

In column 12 the area that is twice cropped in the year is entered, in office, from the information contained in the four previous columns.

In columns 13 and 14 are entered the description and area of all uncropped land, under the headings of new or old fallow, tree land, grass, covered with water, village sites, rivers, ravines, roads, and so on.

In column 15 is entered a description of the natural soil, whether clay, sand, or loam, and its conventional classification, whether the field lies in the home-land—that is in the well-cultivated circle round the village—in the middle tract, or in the outlying and worst cultivated parts of the village lands.

Column 16 is for general remarks, and contains all the information regarding the field, that could not find a place in the other columns. For instance, in the case of the death of a landlord or tenant, if no change has been made in the official papers, the names of the heirs are entered in this column. The number and different kinds of trees in gardens and groves are here entered. A description of all wells is given, whether they are lined with masonry set in lime, or in clay, or are unlined, also the depth to the water, and of the water, the cost of making them and the date, the manner of working them, whether by bullocks or men, and how many buckets can be used to lift water at one time. Remarks also regarding the ownership of the wells, of portions of the village site and of trees in fields are made in this column, in which everything necessary to complete the history of the field is entered.

When this book is completed, attested, and agreed to by all concerned, and passed by the settlement officer, it becomes for the future the record-of-rights of the village community.

When the information regarding the field has been recorded in the Persian and Hindi Khasras, by the surveyor and the village accountant, the latter enters the number of the field in the rent-roll slip of the tenant.

These slips are divided into eleven columns:—

The 1st contains the name of the division of the village in which the field lies, with the names of the proprietors, their descriptions and shares, and the name and description of the mortgagee, if any.

The 2nd column contains the serial number of the tenant, which is given after all the tenants are arranged according to their tenures.

The 3rd column contains the name of the tenant, with his parentage, caste, and residence, and the name of the mortgagee, if any.

Column 4 contains the name of the sub-tenant, with his parentage, caste, and residence.

Column 5 gives a detail of the nature of the tenure or lease under which the field is held, and the length of occupancy of the tenant.

Column 6 contains the numbers of all the fields held by the tenant from the same landlord under the same tenure. These numbers are

entered by the accountant on the slips when in the field, and the tenant interested brings forward his slip for the purpose of having the entry made. He thus knows that he has the numbers of all his fields entered on the proper slips.

Columns 7 and 8 give the area of the field in local and in Government bighas. The latter are five-eighths of an acre, but the local bigha may vary in each district and in different sub-divisions of a district. These areas are entered after the fields are calculated in office.

Columns 9 and 10 contain the amount of rent paid by the tenant to the landlord. Rents are paid either in cash or by a share of the crop. Column 9 contains the cash rents, column 10 the crop rents.

Cash rents are generally paid at so much per bigha, and they vary according to the soil and the crop grown. When rents are paid in kind, the grain is cut, carried to the threshing-floor, and threshed out by the tenant. It is then divided in whatever proportions may have been agreed upon between him and the landlord. The village servants, such as the watchman, the messenger, the carpenter, the blacksmith, the barber, the sweeper, and others, then get their shares, if entitled to any, and the remainder belongs to the tenant. The village servants are often paid by holding certain fields rent-free in lieu of service.

Column 11 contains any remarks that it may be necessary to record regarding the field or the rent.

Separate Jamabandi slips are prepared for each separate cultivator, and for each separate landlord, and separate tenure under which he holds. Separate slips are also prepared for groves, old fallow, new fallow, village sites, waste, rivers, roads, and other items. In a specimen village (which I have here) there are 193 fields in an area of 94·11 acres, and for these here have been prepared forty-eight Jamabandi or rent-roll slips.

While these papers are being written, if any dispute arises between landlord and tenant, or regarding the landlord's rights in the village, the entry is made in the papers in red ink, and the claims of the plaintiff and defendant, under their signatures, are recorded in a dispute list, which the surveyor files with his map and papers. These disputes are afterwards disposed of by the settlement department, and the correct entry is recorded. Many points of difference are settled at the time of survey by a reference to the village papers of former years.

When the surveyor has completed his map, record, rent-rolls, and dispute list, he sends them into office, where the map is inked up for reproduction by photography, and the areas of the fields are calculated and entered in the different papers in acres, in Government and local bighas.

The areas are calculated by means of an instrument called a "talc square." A very thin sheet of talc or mica is divided by fine scratches into small squares, each representing the hundredth part of an acre on the

16-inch scale. This sheet, which is transparent, is laid over the field, and, with a pair of compasses and a scale, the estimators quickly and accurately calculate the number of squares in the field, recording its area to the hundredth part of an acre. The conversion into bighas is done by means of tables of equivalents.

After the areas are entered in the records and rent-roll slips, several abstracts and comparative statements are drawn up for the settlement officer to aid him in his assessments.

1st, An area statement, giving the non-assessable area, such as rent-free village sites, covered with water and barren. The assessable area distinguished as culturable waste, fallow, and cultivated, the latter divided into irrigated and dry cultivation.

2nd, A soil statement, giving the acreage under five different natural soils, and the amount irrigated and dry.

3rd, A statement of holdings, showing the number of fields and area in acres of the land held by proprietors, ex-proprietors, rent free, by occupancy tenants, and by tenants-at-will.

4th, A crop statement, showing for the autumn and spring harvests the areas under the different kinds of crops, distinguishing the food and non-food crops, and giving the area of the land producing two crops a year. The statistics regarding the food and non-food crops are abstracted, that the information may be available in cases of threatened famine.

5th, A statement of cultivators, giving their different races and castes, such as Muhammadans, Brahmins, Chhatris, Ahirs, Koeris, and others, together with the number of fields and area cultivated by each caste.

6th, A detail of the soils under five heads of natural soil, such as clay, loam, sand, or alluvial deposit, with the conventional classification into home, middle, or outlying lands, and distinguishing the amounts of the different kinds cultivated by proprietors and by tenants.

7th, Statistics regarding the wells, the area irrigated, the depth to the water, the number of ploughs, cattle, sheep, goats, and horses.

There is also prepared for the settlement department a trace of the village map, with the fields numbered as in the original, and it is coloured to show the natural soils and the conventional tracts of home, middle, and outlying lands.

Also, when required, there are prepared coloured traces of the village map, showing, first, the occupancy tenures; second, the principal crops grown, and the fields that are double cropped; and, third, the principal castes of the cultivators.

The method of preparing these maps and papers has been described with perhaps tedious minuteness, but it has been shown that the process of inquiry is very searching, and when the results have been recorded, we have, regarding each individual and each field, a mass of information which enables the settlement officer to adjust the Government demand

to all the varied circumstances of the cultivators, and places in the hands of the district authorities, regarding the land and the crops, statistics that are of infinite value in times of famine or other disturbances of the food supply, and which enable the reports, as to the areas yearly under crops, to be made up with an approach to accuracy which has never hitherto been attained.

Maps of the district are prepared as follows :—The stations fixed on the village boundaries are plotted on sheets containing so many minutes of latitude and longitude, according to the scale of the required map. This may be four inches or two inches to a mile, generally the latter. Each village has its topography reduced by an instrument called a pentagraph to the required scale in pencil on the exact position it should occupy on the map, and thus the map of the district is gradually built up village by village. These maps are inked in for reduction by photography, and are sent to Calcutta to be printed and published. They are further reduced to the scale of about four miles to an inch, and engraved for the atlas of India.

The original village maps are sent as soon after survey as possible to the head office in Calcutta, where they are reproduced by photozincography on the scale of survey, and ten or twenty copies of each are printed off for the settlement and district officers, and also for sale to the landlords who may desire maps of their estates.

All the calculations in the Survey Office are performed at least twice over by independent sets of estimators, and as the fields are very small, amounting sometimes to a million or more in a season's work, it can be imagined that the mapping, calculating, and tabulating such a mass of figures entails a large amount of work on the survey establishment.

The establishment of a cadastral survey consists of a deputy superintendent in charge, an assistant superintendent, five to seven European surveyors and assistant surveyors, about 250 field surveyors and inspectors, 250 draftsmen, calculators, and supervisors, with about 400 or 500 chain and flagmen.

This large establishment is kept up only during the surveying season, which extends from October to May; during the rest of the year the establishment consists of the European staff, and about 150 draftsmen and calculators sufficient for completing the maps and records of the work of the field season.

A general idea of the work of one cadastral survey party for a season may be given by stating that the outturn is about 2000 villages averaging about 220 acres each, and containing a million of fields or more of a size of ·3 to ·4 of an acre each. The amount of country surveyed in a year varies from 650 to 800 square miles. The cost of survey and preparing the records is about sixpence an acre.

When the amount of work in the survey and preparation of the records of one village is taken into consideration, and then multiplied by

the number of villages in a season's operations, it will be seen that the survey staff is fully employed, and it is only by subdivision of labour, and exacting a sufficient tale of work from each man, that the area of the season can be disposed of.

Up to this time cadastral surveys have been made of ten districts in the North-West Provinces, containing an area of about 20,000 square miles, and a population of about nine millions, giving an average of about 450 souls to a square mile. But the density of the population varies in different districts, being highest in Benares, where there are about 900 souls to the square mile, or nearly one and a half to each acre. Belgium, the most densely populated country in Europe, has 485 to a square mile, and in the British Isles there are 287. As the natives of India depend almost entirely on agriculture for their livelihood, the struggle for existence in these overcrowded tracts is very great.

Besides the cadastral surveys carried on in the North-West Provinces there have been others employed in British Burmah, where the conditions of survey were somewhat different. In Burmah the cultivation is mostly rice, and lies in low, swampy tracts. The extent of the cultivation varies from year to year, and the limits of fields are liable to change. To ensure permanent advantages from the survey, the rice land has been demarcated into blocks, and the areas of each of these have been calculated. The Revenue officers can thus readily ascertain how much land is under cultivation. In Burmah, where the lands are leased from year to year, and revenue is paid on the amount of cultivation, the application of a cadastral survey has resulted in a large increase of revenue to Government, not from extra assessments, but from the facility with which the true amount of land under cultivation can now be ascertained.

Cadastral surveys have also lately been introduced into Assam, where the conditions of cultivation are very like those in Burmah. The result will be an increase to the Government revenue, and a development of the country which has attained prominence as a tea producer, and which in its extensive jungle tracts of fertile land, about to be opened up by a railway, seems destined to afford an outlet for the surplus population of over-crowded districts in Bengal.

A few words may now be said regarding the advantages derived from this elaborate survey, record-of-rights, and statistics.

One great source of litigation and ruin to many who engage in it arises from disputes regarding the boundaries of villages and estates. Where no maps exist, or where eye sketches merely were made, or even where in better attempts at map-making the village map was built up field by field, there has always been great uncertainty about the boundaries. Where there are no maps of course there is no guide to correct boundaries, and in imperfect maps the land has been sometimes shown as belonging to two villages, while in the case of a dispute and litigation surveys were made by native surveyors, but often the case has been

decided on maps made to suit the party who had the longest purse. Many of these disputes have found their way home to the Privy Council, after all courts of appeal and re-appeal in India have been exhausted.

Where a cadastral survey is made, these disputes are all inquired into and settled at the time, of course subject to appeal, and being once correctly marked off and mapped can never be opened out again.

Another class of disputes regarding the internal divisions of fields will be stopped. The fields of a tenant's holding do not all lie contiguous to each other, but are scattered all over the village lands in small portions, arising from continued subdivision. Fields are generally divided from each other by a narrow strip of land left uncultivated, and this strip varies from two or three inches to a few feet wide, the latter mostly in places where it is necessary to leave pathways and roads for communication during the rainy season. In many cases, however, where land is valuable and where the population is dense, there are no divisions left between the fields, or the marks are merely tufts of grass here and there, or small trees planted at the corners of some of the fields, to serve as the landmarks of the different holdings. In alluvial tracts subject to river action the annual inundation destroys the field boundaries. In all these cases the relaying and restoring of the field boundaries often lead to disputes and litigation, and even to bloodshed. But now it will be easy from the survey map to relay any field, as its distance from any others that remain intact, or from permanent marks which are left on the village boundaries, can be found from the map, and the field can be restored to its original position on the ground. This will stop many disputes and much litigation.

By far the greatest advantages, however, will be derived from having a correct record of the rights of landlords and tenants. These give rise to endless disputes, and in many cases an attempt is made to deprive the tenants of their rights. There will now be an authenticated record for each village, showing the rights and interests of every proprietor and tenant in it, the tenures under which they hold, the number of years they have occupied, and the rents they pay; and as Government has devised a machinery, consisting of the Revenue officers, the village accountants and supervisors, to keep the papers up to date, it is to be hoped that the advantages of this survey will last for many years.

The application of the provisions of the Bengal Rent Bill, lately passed, will depend on having correct maps, areas, and records of each village and each field, and in the Bill provision is made for having a cadastral survey of Bengal Proper, which is all under the permanent settlement. During next field season this work will be begun, and it is hoped it may be successful. The survey of the whole province will take many years, but when it is completed it will give to the Government, regarding Bengal, a mass of information which will facilitate the administration of the law, will fix and regulate the relations between

landlords and tenants, and will remain a lasting monument to the sagacity and foresight of the present Lieutenant-Governor of Bengal, Sir Rivers Thompson, to whom that country is indebted for the Rent Bill.

In temporarily settled districts these maps and records are necessary to enable the settlement officer to fix the Government demand for the next thirty years. With all the information regarding areas, soils, crops, irrigation and castes of tenants, he is able to fix the proper rents with almost mathematical accuracy, and it is well that this should be so, since the prosperity and happiness of so many beings depend on the proper adjustment of the rents.

Again, in any one year the Government can ascertain the amount of land sown with the different crops, whether food or non-food producing, can tell in years of drought how much land is protected by irrigation, and can forecast with some approach to accuracy the probable extent and pressure of scarcity. Moreover, since India has become a great grain-exporting country, it is of immense benefit to its trade to be able to gauge the probable amount of crops of different sorts available for export.

But from knowing the exact resources of the country another great advantage will accrue to the administrators who in the near future will have to deal with some complicated social problems. One of these is how far the process of subdivision of the land can be allowed to go on; and another is what is to be done with the rapidly increasing population, which in some districts is so great as barely to leave a margin between subsistence and starvation when any slight failure of the crops occurs.

Before our Government gave settled rule to India and improved the sanatory condition of the people, there were several causes that acted as safety valves to prevent overpressure of population. These were—wars, famines, pestilences, and female infanticide. No one could wish a return to the first. Every effort is made to prevent the loss of a single life by famine. The sanatory condition of villages is inspected to guard against cholera. Vaccinators are appointed everywhere to fight against the scourge of small-pox, and female infanticide is a thing of the past.

The result of all this, joined to the effects of infant marriage, is that the population is increasing at a rapid rate. The country has very little manufacturing industries, and the whole mass of the people depends on what the earth will produce. The amount of production has a limit, and when that is reached scarcity must either set in, or the surplus population will have to be drafted off to other parts of the country, where there are still uncultivated lands and room for the extension of agriculture.

Questions such as these regarding the future of the country and the cultivators cannot but arise in the mind of the surveyor, who has to live among the people, often for months far away from any of his own countrymen. Such considerations make his work very interesting,

while he is encouraged in his task by knowing that it is useful for ameliorating the condition of the people in India, where land and all relating to it are questions of the first importance, involving life and death to so many struggling millions. He is cheered by the thought that he is assisting the Government to regulate wisely its relations with its tenants, and to forward—as it is its greatest wish to do—the material prosperity and happiness of the vast countries and populations committed to its charge.

# SPIRIT-LEVELLING OPERATIONS

OF THE

# GREAT TRIGONOMETRICAL SURVEY OF INDIA.

By MAJOR A. W. BAIRD, R.E., F.R.S., &c.,

DEPUTY-SUPERINTENDENT, SURVEY OF INDIA.

# SPIRIT-LEVELLING OPERATIONS OF THE GREAT TRIGONOMETRICAL SURVEY OF INDIA.

By MAJOR A. W. BAIRD, R.E., F.R.S., ETC.

(Deputy Superintendent, Survey of India.)

THESE operations have for their object the connection of the several Tidal Stations by Lines of Spirit-Levels running along the Coast, and across the continent of India from sea to sea: also the connection of the principal stations of the Great Triangulation which fall in the neighbourhood of the lines of levels, with a view to the rectification of the differences of height, which have already been determined by the less accurate trigonometrical method. Collaterally with these operations a great number of the bench marks of the Irrigation, Railway, and other branches of the Department of Public Works have been connected, with a view to their general combination and reduction to a common datum.

From the origin of the Trigonometrical Survey in India up to the year 1858 all heights were invariably determined by the method of reciprocal vertical angles, between the principal stations of the triangulation. This method is based on the supposition that the back and forward angles are equally refracted, and that the refraction is consequently eliminated in deducing the angle subtended by the excess of the higher station over the lower. But the anomalies and irregularities of the trajectories of light in the lower strata of the atmosphere render it highly improbable that the refraction can be equal in the back and forward observations.

In 1858 the Great Trigonometrical Survey of India commenced a series of Spirit-levels, which up to May, 1862, had been so far extended that the Chach Base line near Attock, the Dehra Dun, and the Sironj, base lines, had all been connected with the Mean Sea Level at Kurrachee, making a total of 1998 miles of double levelling, executed by two and sometimes three independent observers working with different instruments and staves on the same points.

The following is a brief description of the rigorous method of procedure which was laid down by General Walker, and has been adopted in carrying out the levelling.

The instruments employed are Standard Levels, by Messrs. Troughton and Simms, of 22 inch focal length, and power averaging 42—very superior to ordinary levelling instruments. The levels are fitted with finely graduated scales, and have their runs determined by a series of observa-

tions on the vertical circle of a large theodolite, and sometimes by a great number of observations to a graduated staff generally set up at exactly 10 chains distant from the instrument. From the mean value of the "run" subtense tables are constructed for use in the field, showing the corrections for dislevelment which are applied to every observation.

As this necessitates a certain amount of computation on the ground, a trained native recorder accompanies each observer, thus dividing the labour, and enabling the surveyor to concentrate his attention on the actual manipulation of, and observations with, the instrument.

To guide in obtaining a true perpendicular the staves are supplied with plummets let into the sides, and visible through glass doors. Swivels are fixed to the tops of the staves for four guy ropes, by means of which they are adjusted and kept steady when once properly fixed. Whenever the staff is set up a wooden peg is previously driven well into the ground, and into the head of the peg is fixed a hemispherical brass brad—which presents a smooth surface, or point on which the brass shoe of the staff rests, and can rotate freely. If the staff is to be set up on a permanent bench mark cut on a stone, the head of a brad from which the spike has been removed is placed on the bench mark, so that the staff may always have a point to rest on.

Starting from a bench mark a brad is used, and also the same precaution is taken when closing on a bench mark. Thus as the levelling operations merely determine differences of height, the levels of the two bench marks "intense" are obtained.

To prevent the possibility of errors in reading the staves escaping detection, the staves are graduated on both sides, one side having a white ground and black divisions (feet, tenths, and hundredths), numbered from 0·00 foot to 10·00 feet; the reverse side having a black ground with white divisions, numbered from 5·55 to 15·55 feet.

Both faces of each staff are observed: thus, two independent values of difference of level are obtained at each station when the instrument is set up, and this forms one set of observations.

The staves are read off to the third place of decimals of a foot, and if the difference between the two values obtained, after the correction for dislevelment has been applied, amounts to ·006, *i.e.* $\frac{6}{1000}$ of a foot, the invariable rule is to repeat the observations. Should the day be unfavourable, sometimes four or five sets of observations have to be taken at a station, and the mean of all the sets taken as the true value.

The instrument is invariably put midway between, or at equal distances from, the back and forward staves, the distance to each staff —which is always carefully measured with a chain—varying from 10 or 12 chains in a clear morning and over fairly level ground, to 3 or 4 chains between 10 and 11 o'clock in the forenoon, when it begins to warm up. The rate of progress is not as rapid as in ordinary levelling operations, but four miles a day may generally be reckoned on.

A second observer with a separate instrument, recorder, staves and khalassies (the men who carry the instrumental equipment of the party) follows the first observer, over the same ground, resting his staves on the same pegs and brads that were used by his predecessor, and carefully comparing the results. Whenever a difference exceeding 0·006 of a foot appears between the results of the two observers the observations are repeated, and should the discrepancy still remain, the prior observer is called back to re-observe, and the second leveller takes the lead. But as a matter of fact this is a rare occurrence.

The rule of equal distances between instrument and each staff eliminates all collimation error in the level, and it also eliminates the effects of the curvature of the earth and all constant refraction.

The line of levels is divided as nearly as possible into equal sections, and adjacent sections are levelled over in opposite directions. Thus, supposing the general direction of the work is from east to west, four miles will be carried out from east to west; the next day four miles from west to east will be levelled over, and so on. Of course the distance one day may be a little more or less than the distance the next day, but it is arranged that the total of all the sections in one direction will be as nearly as possible equal to the total distance of the sections in the opposite direction. Not only is this system carried out in sections, but it is followed to a certain extent at each alternate station throughout the section. Thus in commencing it is usual to observe the back staff first; at the next station the forward staff is observed first; at the third station the back staff is again first observed, and so on.

This system was devised to guard against the accumulation of small constant errors, as it has been found that levelling steadily in one direction is liable to give a different result from what is obtained when levelling in the opposite direction.

It involves a great deal of extra marching (as the whole ground has to be twice gone over), but this is deemed essential for the acquisition of really trustworthy results.

It has been already stated that 1998 miles of levelling had been carried out from the commencement in 1858 up to May, 1862. Between 1862 and 1865 the line of levels had been extended from Agra via Patka Gerouli and Tilliagarhi (near Sahibgunge) to Calcutta, thus adding another 931 miles of levelling to the main line, besides connecting various stations of the Great Triangulation by means of branch lines. The terminal station at Calcutta was the sill of the Kidderpore Dock; but the mean level of the water at Kidderpore is of course very much higher than the mean level of the sea, as although the Hooghly is a river, in which the influence of the tide is felt much beyond Calcutta, yet from the sea proper at the head of the Gulf of Bengal to Calcutta is over 100 miles. Thus no very reliable test of the accuracy of the work could yet be obtained.

Between 1865 and 1872, the levelling operations were for the most part carried out in the North of India. Thus lines of levels from Ferozepore to Lahore and Mean Meer, from Mooltan to Dehra Gazi Khan, and also from Delhi to Meerut, and Saharunpore to Umballa were carried out in one season. Next year from Meerut to Moradabad, Bareilly and Pilibhect was completed, and the following year from Bareilly to Cawnpore via Shajehanpore, Sectapore and Lucknow was finished; the last-named line was continued the next season to Fyzabad and Goruckpore, and on to Dildarnugger. Afterwards the levelling was carried from Goruckpore to Bettia and Mozufferpore to Darbhanga: and next year this was continued to Sahibganj, Purniah and Karagolaghat to Pirpanti, on the main line of levels from Kurrachee to Calcutta.

This completed the levelling in the North of India, and if we include the short line of 71 miles which was carried out in the South of India from Tuticorin to the Cape Comorin Base Line, during the season 1869–70, we have 1705 miles to add to the total of the levelling done up to 1872.

Before discussing the further progress of the levelling, it should be mentioned that the heights in the Great Trigonometrical Survey of India up to 1874 were dependent on determinations of sea-level which were obtained from personal observations on a graduated pole, taken generally at every quarter of an hour day and night for a few days, or at most for one semi-lunation. These observations were carried out at several places on the coast line, viz.: Diu Harbour (in Kattyawar), Karwar, and Mangalore, all on the West Coast; at Vizagapatam on the East Coast, and at Tuticorin near the extreme South of India. At only one place (Kurrachee) had observations been taken with a Self-Registering Tide Gauge previous to 1869; the value of Mean Sea Level which had been deduced from the Kurrachee work was obtained from observations taken over two semi-lunations with that gauge; and on this value depend all the heights in Sind, Panjab, &c.

Systematic Tidal observations by means of Self-Registering Tide Gauges were commenced by the Great Trigonometrical Survey in 1873, when gauges were set up at three places in the Gulf of Cutch. An account of these operations, which were carried out for a special purpose, was given in a paper which the writer read before the Physical Section of the British Association at Glasgow in 1876.

It may be said that at Okha, the station at the mouth of the Gulf of Cutch, the first very accurate determination of mean level of the sea was obtained. Subsequently, in 1877, the Government of India ordered that a systematic record of Tidal observations at selected places all round the coasts of India and Burmah should be carried out. It is unnecessary to refer here to these operations, except in so far as they are considered with regard to determining the exact value of mean sea level at certain places; but it may be stated that Tidal observations are being carried

out simultaneously at 20 stations on the coasts of India, Ceylon, and Burmah, including Aden and Port Blair in the Andaman Islands. Besides these, observations have been completed at four other stations, in addition to the three places in the Gulf of Cutch.

As a rule the minimum time of observation is taken to be five years, for the mean level of the sea can be very accurately determined during this period. The mean level as derived from Tidal observations for one year differs slightly from that obtained from observations from the preceding or succeeding year, but the fluctuation in the value is very slight. Thus at Kurrachee, where observations were made during 16 years, the highest level in any year only differed to the extent of 0·148 foot from the mean of all the years, and the lowest differed 0·132 foot; the fluctuations thus amounting to 0·280 foot.

It is a happy coincidence that the hitherto provisionally accepted value of the Kurrachee mean sea level as derived from two semi-lunations agrees closely with the accurate determination from 16 years' observations, and thus all the heights given in the published pamphlets of the levelling operations in Sind, Panjab, North-West Provinces, and Bengal are practically correct.

Between 1873 and 1875 over 600 miles of levelling had been done in Madras, viz.: from Gooty to Bellary, Dharwar and on to Karwar, and also from the Bangalore Base Line via Tumkur and Honore to Bellary, and thence via Adoni to Raichore.

During this time also the line of levels round the Gulf of Cutch had been carried out, which extended to 304 miles, making with the Madras levelling 905 miles to be added to the total of levelling up to 1872.

The line of levels during the next two seasons had been carried from Torya on the Gulf of Cutch through Kattyawar and on nearly to Bombay, and besides this a large loop line from Shikarpur on the Runn of Cutch to Patri and Viramgam, thus adding 778 miles to the work already executed.

During the next four seasons which ended in 1880–81 the work had been extended to Bombay, and from Bombay to Madras, with a branch line from Poona via Sattara and Belgaum to Dharwar, to join the line of levels from Bellary to Bangalore; and also branch lines from Sholapur to Rijapur, and from Gulbarga to the Bider Base Line had been carried out: and the main line was extended from Kalyan near Bombay to Chikalvohol near Malegam in Khandesh, making in all 1796 miles of levelling for the four seasons.

From 1881 up to the season which has just closed (1884–85), the levelling has been carried from Chikalvohol near Malegam to Mhow and Indore, and on to join the Sironj Base Line in Central India, where the levels from Agra terminated.

Also False Point Tidal Station had been connected with Kidderpore,

so as to make the line of levels from Kurrachee to Calcutta end at a tidal station at the sea coast on the east side of India. Lines of levels were carried to Dublat and Diamond Harbour Tidal Stations, and also along both banks of the Hooghly, so as to give bench marks for the river surveyors.

During the last field season Madras and Beypore have been connected, and a branch line was taken from Jollarpet to Bangalore, thus connecting Karwar with Madras and Beypore. This has added 1567 miles to the levelling operations, making in all the magnificent total of 9680 miles of double levelling executed by the Trigonometrical Survey between 1858 and the present year. Besides this some 300 miles of single levelling by branch lines to trigonometrical stations have been levelled over. During this period, there were only two seasons in which levelling operations were not prosecuted. Thus the time occupied in carrying out this vast amount of work has been exactly a quarter of a century.

To give a practical and familiar illustration of the magnitude of these operations, taking the line which runs from Kurrachee up the Indus to Mithankote, and onwards via Ferozpore, Agra, Allahabad, Monghyr and Calcutta to False Point is 2300 miles in length. If this distance be converted into longitudinal degrees for the latitude of London, it represents, say, 53° of longitude; and if stretched out eastwards, would reach from London straight across the Channel through Germany and all Russia to Astrakan. It is most probably the longest line ever run between two seas, and the error in levelling does not exceed 1 foot 8 inches, or under one inch per one hundred miles.

Again, the line of levels taken from the Chach Base near Peshawar, in the extreme North, and extending to Beypore in the South, represents over 22° of latitude, a distance greater than that embraced between the most northerly point of Scotland and the most southerly point of Spain.

The difficulties experienced in carrying out this enormous piece of work have at times been very considerable. Bad roads or want of roads, and having to carry the levels through long grass, and crossing large rivers, such as the Kosi, and more especially the Ganges; and the Hooghly occasioned great trouble. In taking the observations across these large rivers special arrangements had to be made, by pasting on the staves slips of paper divided only into feet and tenths, as of course the smaller divisions on the staves could not be recognised. On these occasions about fifty sets of observations by each leveller had to be made at each long crossing. In going from False Point to Calcutta, and down the banks of the Hooghly to Dublat in Sangor Island, the work was exceptionally troublesome. First of all a very difficult network of creeks at the mouth of the Mahanadi had to be crossed, until "terra firma" was reached on the banks of the Kendrapara Canal. This necessitated wading for about eighteen miles through an extensive jungly swamp, which is wholly covered with water at spring tides, and is never entirely free

from it. The stands of the instruments had frequently to be set up in water about two feet deep; and as the soil below was loose and slushy, so that any movement on the part of the observer disturbed the level of the telescope, the first observer had to summon his coadjutor from a station in rear, to read the level at the moment he was reading the staves with the telescope, and then he had to return and perform the same duty for his coadjutor. Various creeks and rivers, ranging from a quarter to three-quarters of a mile in breadth, had to be crossed before Kakrahati was reached, but in all cases the crossing was accomplished by direct spirit-levelling, though occasionally staves with the broad graduation slips had to be used.

To cross the Hooghly in this manner was found impracticable, as the river was considerably over one mile in width at its narrowest part. Temporary tide gauges were set up on both banks, at a part where the main channel and the banks were parallel to each other. Simultaneous readings of the level of the water on both gauges were taken by the two levellers at high water, and also during rising and falling tides. The surface of the water was very smooth, and upwards of 300 observations, extending over four days, were taken. A difference of level of nearly two inches was found between rising and falling tides, but the mean of both differed by only two-thirds of an inch from the level at the top of the tide when the surface of the river was neither rising nor falling; and the general mean may be accepted as within half an inch of the truth, and is probably much more exact than any result which might have been obtained by measuring the vertical angles across the river by any other process.

The following season similar difficulties were experienced along both banks of the Hooghly. But from what has already been said it will be seen that considerable skill is frequently necessary to overcome the obstacles that occur; and indeed at times it was only from the zeal, activity, and good management of the assistant in charge of the detachment that the difficulties were overcome. In 1882-83 the surveyors were harassed and exposed to an extent which induced bad health, panic, and desertion, and it was with very great trouble that the season's work was completed.

Now with regard to some of the results of the operations.

From the mean sea level of the tidal station at Okha, at the entrance of the Gulf of Cutch to that at Bombay, there is an apparent rise of 0·33 of a foot, *i.e.* 4 inches in a length of line of 530 miles.

From the mean sea level Bombay to that of Karwar there is an apparent rise of 0·93 of a foot, or 11 inches in a length of line of 530 miles.

From Kurrachee to False Point there is an apparent rise of 1 foot 8 inches in 2300 miles.

From Bombay to Madras the discrepancy was very great, being nearly 3 feet in 730 miles; also an apparent rise.

From Karwar via Bellary, Bangalore, and Jollarpet to Madras there is a rise of 0·55 of a foot, or nearly 7 inches in 519 miles.

It must be here mentioned that in all these cases it is the southern stations which appear raised above the northern stations. On the other hand the following cases show a reverse result, that is, the southern stations are lower than the northern.

From Kurrachee via Mithankot, Ferozpore, and Agra to Sironj and Bombay there is a fall of 0·62 foot, or 7½ inches in 2030 miles.

From Madras to Beypore a fall of 0·658 foot, or 8 inches in 407 miles.

From Karwar via Bellary, Bangalore, Jollarpet and on to Beypore there is only a fall of 0·1 of a foot, that is, a little more than one inch in 663 miles; or the mean sea level at Karwar and Beypore are almost identical as determined by spirit-levelling.

The first five lines, in each of which the mean sea at the southern station appears to be higher than at the northern, were those first completed. General Walker commented on them in his Annual Report to the Government of India for 1880–81, and suggested that the discrepancy was chiefly due to errors in the levelling operations, caused from a liability to personal misapprehension in reading the bubble of the spirit-level, which may tend to produce a considerable accumulation of error on lines of which the general direction is either towards the sun or opposite to the sun. Owing to the spirit-level being placed above the telescope, the observer gets a side view of the bubble refracted obliquely through the thickness of the glass tube, which is not so sharply defined as the look down view from above. The rim round the bubble, caused by the adhesion of the liquid to the sides of the tube, becomes so prominent that its extremities may be observed instead of those of the bubble. When light falls obliquely on the instrument and either end of the instrument is pointed towards the light, the outer edge of the rim at the end of the bubble towards the light is more clearly defined than the inner, while at the opposite end of the bubble the inner edge of the rim is the more clearly defined. Consequently there is a tendency to assume the instrument to be level when in reality the end towards the light is depressed, and, though the tendency would probably vary in magnitude with different persons, it is likely to affect all persons more or less. Obviously it is uninfluenced by reversing the direction of the operations, though it disappears when the direction of levelling is at right angles to that of the light.

This illumination error is a maximum on the meridian, and vanishes on the prime vertical. However great its magnitude it is non-apparent in a circuit of levels, and is only apparent on lines starting from and closing on the mean sea, which affords an independent check on the levelling operations. When the operations are carried on between sunrise and mid-day, as is usually the case in India, the direction of the line of average effect would be south-east and north-west; and the result would be to apparently raise the southern stations relatively to the

northern ones, though not to the same extent as if operations were carried on throughout the entire day.

It is to be noted, however, that so small an error of level adjustment as 1″·2 of arc recurring with the same sign at only one-fourth of the stations at which the instruments were set up, would produce a discrepancy such as had been met with in the line between Bombay and Madras.

When General Walker made this suggestion, the raising of the southern stations had been found to occur in a greater or less degree on all the lines of levels connecting the tidal stations. Since then, however, the Kurrachee-Bombay line, the Madras-Beypore line, and the line from Karwar to Beypore via Bellary, Bangalore, and Jollarpet have been executed. In the first two of these lines the southern stations are lowered relatively to the northern stations, and in the last line the northern and southern stations are practically identical.

Thus the operations since 1881 throw a doubt on the southern stations being apparently raised relatively to the northern, and the explanation of the Bombay-Madras discrepancy of sea level must be sought for otherwise.

Quoting from General Walker's note already referred to, he says:—"That there are variations in the general level of the surface of the ocean at different places, so that if compared with the surface of the spheroid or other geometrical figure which most closely corresponds with the figure of the earth the surface of the ocean will in some places be above and in other places be below that of the figure, is probable enough: and indeed this must certainly happen whenever the attracting influences of mountains and other irregularities of the earth's surface on the water of the ocean are not counteracted by deficiencies of density in the strata below the elevated masses. But as the surface of the ocean is everywhere maintained in equilibrium—excepting, of course, the oscillations of the tide—there can be no flow of water from one point to another: thus there can be no sensible differences of level, though some points on the surface may be materially higher than other points as referred to a hypothetical geometrical surface, or, say, the earth's centre. *The differences of height, however considerable, must be insensible, because they cannot be measured by instrumental means; for the causes by which they would be produced must equally affect both the spirit-levels of the instruments and the water-levels of the ocean, whenever both are subjected to the same influences.* Thus if the spirit levels had been carried without error along the coast from Bombay via Cape Comorin to Madras, they must have shown identity of mean sea level at Bombay and Madras, just as has been met with in the Red Sea and the Mediterranean, on opposite sides of the Isthmus of Suez; and in the Atlantic and the Pacific Oceans, on opposite sides of the Isthmus of Panama. And this identity would be obtained even if there were actually a considerable difference of height, as is very possible: for the Western Ghats (or Mountains) and the general greater elevation of the

western as compared to the eastern half of the Peninsula are sources of attraction which if not counteracted must raise the mean sea at Bombay more than 31 feet (as calculated by Mr. Hennessey) above mean sea level Madras."

There seems to remain only two possible explanations of the discrepancy between Bombay and Madras.

First, that it is due to the proximate and local attractions of the hills and table-lands over which the line of levels was carried, and which must exercise some influence on the instrumental levels over and beyond the general influence that is exerted alike on both the instrumental and ocean levels.

Or (second) that the error is due to some accidental gross error in the levelling.

Regarding the former of these two explanations, the spirit levels were carried from Bombay up the short and abrupt ascent to the crest of the Western Ghats near Poona, and then down the long and gentle decline to the east coast at Madras. Thus, while subject to the same general attractive influence of the continental masses as the ocean levels, they are subject also to the more immediate influence of local inequalities in the configuration of the ground passed over.

With regard to the second explanation, it seems improbable that the discrepancy can be due to an accidental gross error, seeing the special precautions which are taken, by the employment of two independent operators and instruments, and the use of double-faced staves, to guard against such errors. Moreover the most probable locus of such an error was believed to be in the section over the Ghats, and this was re-levelled, with the result that the two measurements were identical. Quite lately, too, the last portion of the line (about 50 miles) near Madras was re-levelled, the results of the first and second levelling being identical.

The levelling which has yet to be done to complete the whole scheme is as follows:—

From False Point Tidal Station via Vizagapatam and Coconada Tidal Stations to Madras (see broken lines on the map). Then Erode via Trichinopoly to Negapatam, thus connecting Madras and Negapatam Tidal Stations, and also Beypore and Negapatam.

From Trichinopoly via Madura to Paumben Tidal Station, and from Madura to Tuticorin, where a Tidal Observatory is to be set up.

Also from Nowanar Tidal Station through Cutch via Lakpat to Tatta, to join the line of levels in Sind from Kurrachee to Mithankot, &c.

And a branch line from Marmagão (near Goa) Tidal Station to Dharwar, to join the line from Bombay to Karwar: and at the same time Marmagão and Karwar will be directly connected.

If besides these lines the levels are carried across country from the Bider Base line to Vizagapatam, the whole system will be most complete and tied together in a most thorough manner.

Four, or at most five seasons should be sufficient to finish the whole of this work, and when completed it is likely that the portion of the line between Bombay and Madras, where the discrepancy is generated, may be sufficiently localized as to make it worth while having it further examined; and if with the result of no gross error being found, then it seems to me the only conclusion which can be come to is, that the local attractions on the line operated over has been sufficient to disturb the spirit levels to a very sensible extent.*

* The identity of the mean sea level on opposite sides of the Isthmus of Suez and that of Panama having been questioned during the discussion which followed the reading of this paper at the meeting of the British Association, General Walker has obtained the following information on the subject from the Engineer of the Suez Canal, through Major-General Sir John Stokes, K.C.B., R.E.

1° Le niveau moyen annuel de la mer Mediterranée, à Port Saïd, est le même que le niveau moyen annuel de la mer Rouge, à Suez.

2° D'après les études de la Compagnie du Canal de Panama, il n'y a pas de différence de niveau sensible entre l'océan Atlantique, à Colon, et l'océan Pacifique, à Panama.

# SOME REMARKS

ON

# CLINOMETRICAL, OR APPROXIMATE HEIGHTS.

By MAJOR J. HILL, R.E.,

DEPUTY SUPERINTENDENT SURVEY OF INDIA, IN CHARGE OF THE KONKAN TOPOGRAPHICAL SURVEY.

# SOME REMARKS ON CLINOMETRICAL OR APPROXIMATE HEIGHTS.

By MAJOR J. HILL, R.E.,

(Deputy Superintendent Survey of India, in charge of the Konkan Topographical Survey.)

THE problem, how to increase the utility of their topographical maps by more clearly indicating upon them the various slopes and relative heights of all parts of the ground, without unduly increasing the cost of survey, has long engaged the attention of the officers of the Survey of India.

Three methods of portraying the ground have been in use from time to time; the graduations of slope having been shown by brush work, and by either vertical or horizontal hachuring with the pen. The last-mentioned method is the one which is chiefly in use now, although the others are occasionally employed for special work; and the efforts of the Survey officers have been directed chiefly towards improving the system of horizontal hachuring, so that the full amount of information which that method is capable of giving may be found upon the maps.

In delineating ground, it is customary to indicate gentle slopes by light shades, and steep slopes by heavy shades, the depth of shade being proportional to the steepness of slope; and various scales of shade have been devised, with the double object of giving the truest representation of the ground, and of securing uniformity in the drawing of the surveyors.

In the system in use in the Indian Survey, the horizontal hachures, or lines of shading, although not professing to be true contours, are made to represent equal vertical intervals as nearly as is practicable.

When a slope is gentle, equal vertical intervals on the ground are far apart, and the lines representing them on the paper being far apart, produce the effect of a light shade. When a slope is steeper, the equal vertical intervals come closer together, and the lines representing them on the paper being closer together, produce the effect of a deeper shade. When the slopes are so steep that the equal vertical intervals could not be expressed without confusion, or danger of the lines representing them coming together and causing a blot, the procedure is modified, and thick lines are used which indicate greater vertical intervals than the lines representing the more ordinary slopes. When the ground becomes actually precipitous, the horizontal system of hachuring is relinquished, and the escarpment is expressed by bold vertical strokes.

In order to use a scale of shade effectively, so as to depict the

characteristics of the ground with a fidelity and accuracy appropriate to the scale of survey, the various slopes of the ground must of course be known pretty accurately. In the Indian Survey the most accurate method of obtaining those slopes, namely by means of spirit-level or water-level contours, cannot generally be employed, on account of its slowness and costliness. Some cheaper and readier method had to be adopted. The method generally employed at present, seems to be well suited to the scales of survey now in use in the Topographical Survey of India. It consists in determining the heights of numerous points all over the Survey, by means of observing vertical angles to them. The heights so determined are of three classes.

1st. *Trigonometrical heights;* which are the heights of the Trigonometrical Stations and intersected points of the triangulation, deduced from vertical observations with the theodolite: these are entered on the plane tables before the topographical part of the Survey is commenced.

2nd. *Traverse heights;* which are the heights of traverse stations deduced from vertical observations with the theodolite; these also are entered on the plane tables before the topographical part of the Survey is commenced.

3rd. *Approximate heights;* determined by the topographers at the time of their survey by means of observations with clinometers.

With the help of these numerous heights the topographers can judge very closely the correct intervals, and the proper directions of what they term their "eye-contour lines," which are merely the horizontal hachures, or lines of shading, of which mention has been made already.

The trigonometrical heights being generally those of the most prominent objects noticeable from the stations of the triangulation, are seldom so evenly distributed and so close together, even when supplemented by the transverse heights, as to suffice for all the requirements of the topographers. It is important, therefore, that the topographers, with the help of those heights, should be able to determine at once their approximate heights wherever they may station themselves; such subsidiary heights may sometimes be sufficiently important to require recording on the maps; at other times they merely serve the purpose of enabling a surveyor to estimate the correct number of eye-contours he ought to insert in a particular place.

The late Surveyor-General of India, General Walker, in a Circular Order issued by him in 1880, remarked that:

"Determinations of height may be of much value even when they are not exact but only approximate; if the errors are not more than one or two per cent. of the range between the highest and lowest points on the map, the determinations will give a fairly exact idea of the actual configuration of the ground, which may be of much service for engineering and military purposes, provided that the precaution is taken of indicating that they are approximate only, by so printing them on the

map as to distinguish them from the more exact values." . . . . "Plane tables should calculate their heights on the spot, as the value may frequently be serviceable, aiding them to delineate the features of the ground with due attention to the relief." . . . . "The stations whose heights are thus determined, should be shown on the maps by a dot only, and the heights should be given in smaller figures than usual, with the letters *ap* written after them, to indicate that they are approximate." . . . . "The points for which subsidiary heights are desirable are the following:

"(1) Junctions of rivers and streams, (2) junctions of roads, (3) crests of passes through hills and mountains, (4) ferries, (5) open and level or cultivated plateaux in hill tracts, (6) dâk bungalows. For all these, clinometric determinations may be made. When the theodolite can be employed, and greater accuracy be thus obtained, the heights of the following should also be determined, whenever it is possible to do so without much inconvenience; (7) bridges, (8) milestones, (9) temples, (10) tanks, (11) boundary pillars."

Many patterns of clinometers have been suggested and experimented with, but the pattern which has obtained general preference, and which is now issued to all Topographical Survey parties, is the "tangent scale clinometer," of the kind mentioned in the Surveyor-General's Circular Order No. 100, dated 8th February, 1883. It is placed for use on the surface of the surveyor's plane table, over which it can be shifted at pleasure.

It is constructed of metal, and consists of a horizontal adjustable bar (carrying a level), at the object-end of which is an upright arm or vane carrying a tangent scale, while the eye-end carries an upright sight vane, through an eye-hole in which the elevation of an object can be read off on the tangent scale. The sight vane and the upright arm carrying the tangent scale, when not in use, can shut down by hinges which connect them with the horizontal bar, and the whole instrument then fits into a neat box which is very portable and convenient. In introducing this little instrument to the Department, the Surveyor-General remarked:

"It must be clearly understood that the object of employing this instrument is to obtain fairly accurate differential heights of objects at short distances. When in proper adjustment, the uncertainty of the reading of an object through the sight-vane may be taken as about ·002 on the tangent scale; this is equivalent to an error of 20 feet in the height of an object at a distance of 10,000 feet, or in that of the observer as determined by observation of a known point at the same distance: thus, as a rule, objects should not be observed at a greater distance than 2 miles unless several known points are visible, when a mean of several independent determinations may give a fairly trustworthy result. In some instances the first clinometers were employed to observe points which were 10 or more miles distant; this is what they were not intended

for, and what should only be done with a theodolite reading to about a minute of arc; naturally, therefore, they gave results which showed large discrepancies, and were pronounced unsatisfactory. But if the instruments are employed in running a series of heights from point to point at which the plane table is set up—by mutual observations between the points and not by observations to far distant stations—they cannot but yield results which will go far to increase the value of the work, and will give a better indication of the magnitudes of the successive rises and falls in the ground than is probably to be obtained from any hill shading, other than what is executed by instrumental contouring."

In order to use the tangent scale clinometer without extraneous help, some knowledge of arithmetic, including decimals, is requisite; but the agency employed in producing the topographical maps of the Survey of India includes men of the most varied training, from the highly-trained European surveyor down to the native pupil. Many native surveyors, who are excellent topographers, could not write down in decimals a reading from the tangent scale of the clinometer, unless it happened to be one of the numbered readings; and if any one else were to write it down for them, they would not be able, after measuring off their distance on the plane table, to work out the resulting relative height. It seemed a pity that the use of so convenient an instrument should be confined to a section of the topographers, and in order to extend its usefulness to all, Major Hill, the Deputy-Superintendent in charge of the Konkan Topographical Survey, applied himself to devise some means by which any one who can read a scale of feet on a protractor (and of course all the topographers, however inexperienced, can do this) might be able, with the help of the tangent scale clinometer, to obtain his relative height at once, while sketching his ground. The following is the plan, which occurred to him on the 15th of February, 1884, by which any one, after measuring with his compasses the distance on his plane table between his position and that of a distant point, whose height is known, and after noticing where that distant point falls on the tangent scale when he observes to it with his clinometer, even though he may not comprehend the numbering of the scale, can obtain his relative height with reference to the distant point in a few seconds.

At one corner, say the south-east corner of the plane-table graticule, and slightly outside it, a vertical and horizontal line are drawn at right angles to each other, meeting at the point $P$, marked on the accompanying diagram; the vertical line is graduated by means of any convenient scale of equal parts, so as to give a scale of relative heights; the horizontal line is left ungraduated. From these two lines relative heights can be obtained with the help of either a parallel ruler, or of a detached right-angled triangle carrying a scale of tangents carefully copied from that on the clinometer.

To enable a parallel ruler to be employed, a decimal scale of tangents must be indicated along the adopted scale of relative heights, on the opposite side of the vertical line; the decimal notation is employed here, because employed on the actual clinometer.

To obtain relative heights with the help of the parallel ruler, a certain convenient distance is selected, and its equivalent, on the same scale as that on which the survey is being made, is laid off along the ungraduated horizontal line from *P*, the point of its intersection with the vertical line. This distance is called the "setting-point distance," and its extremity furthest from *P* is called the "setting point" (S.P.)

In the diagram the setting-point distance is equal to 10,000 feet. The convenience of this particular value is that, when it is employed, the divisions of the scale of tangents agree with those of the scale of relative heights, so that one scale can be readily constructed from the other. The setting-point distance multiplied by any particular tangent will equal the relative height at the same spot as that tangent on the vertical line. Thus $10{,}000 \times \cdot 06 = 600$. Relative heights depending on distances longer or shorter than the setting-point distance are found as follows on the principle of similar triangles:—

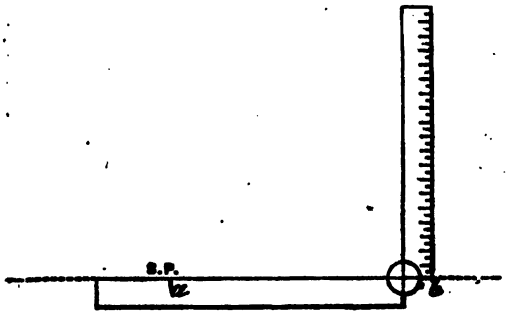
Mark off with the compasses a distance from *P* along the horizontal line equal to the distance on the plane table between the observer's position and the distant point whose height is known, and which has been observed too with the clinometer. Place the edge of the parallel ruler through the setting point, and through the point on the scale of tangents corresponding to the reading of the clinometer. Slide the parallel ruler until its edge passes through the point marked off with the compasses. Its intersection with the scale of relative heights will then give the height required. Thus if the distance on the plane table were one mile, or 80 Gunter's chains, and the clinometer reading were ·04, the relative height would at once be found to be 211 feet.

It will be noticed that no knowledge of arithmetic is involved in this procedure: the observer has only to make with his compasses a measurement, the value of which he need not know, and remember the position of the distant point on the scale of tangents, which scale might be lettered instead of numbered, so far as this process of finding the relative height is concerned.

If instead of a parallel ruler, a detached right-angled triangle carrying the decimal scale of tangents which is shown opposite to the scale of heights, the proceeding is even simpler. Apply the setting point, which in this case is marked on the base of the triangle, to the spot on the horizontal line obtained by measurement from the plane table—the base of the triangle and the horizontal line being coincident—then lay off from the upright tangent scale of the triangle the clinometer reading: the line joining these points will intersect the scale of relative heights, at the height required. This line must be produced when the distance from

the observer to the distant observed point, as measured from the plane table, exceeds the setting-point distance; for then the point on the horizontal line and the point laid off from the scale of tangents will both fall to the left of the scale of relative heights. It is not necessary actually to draw a line in pencil through these points: a straight-edge, such as a side of the detached triangle or the edge of the plane table, sight rule is placed so as to pass through them, and where it intersects the scale of relative heights, is the point sought for.

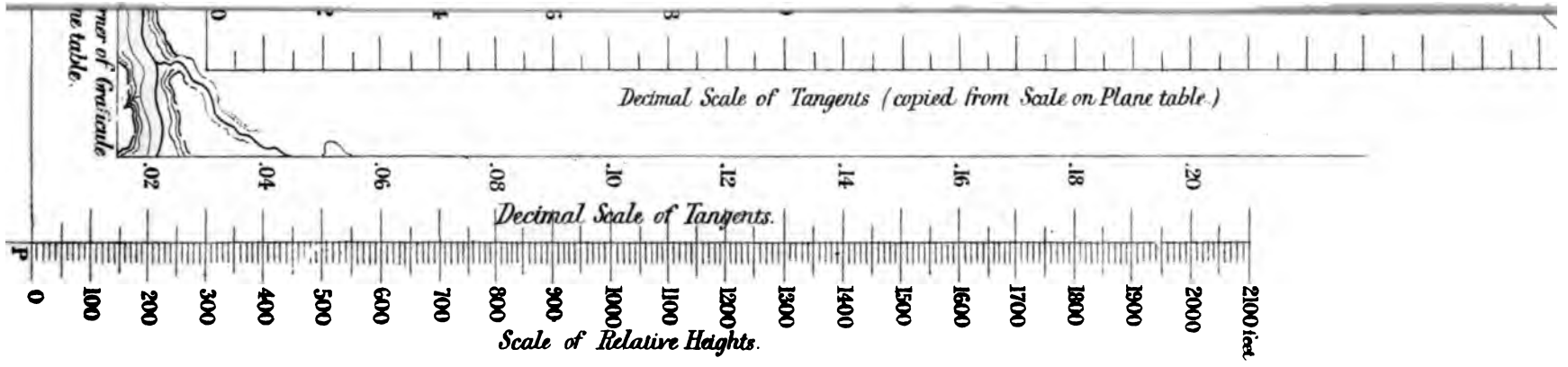
A substitute for the triangle might be constructed of metal consisting of two arms, one carrying a scale of tangents, and the other marked with the setting point, hinged together at the zero end of the tangent scale, and forming a right angle when in use, as shown in the figure, and such an instrument might be graduated so as to serve in addition as a protector, but practically the detached paper triangle may perhaps be all that is generally necessary, for it can be used with ease and rapidity, and when it becomes worn out, another can be constructed in a few minutes by applying the edge of a sheet of note-paper to the scale of relative heights, and marking off the necessary divisions from it with a pen on the edge of the note-paper; the setting point being obtained in a similar way from a marked spot on the horizontal line.

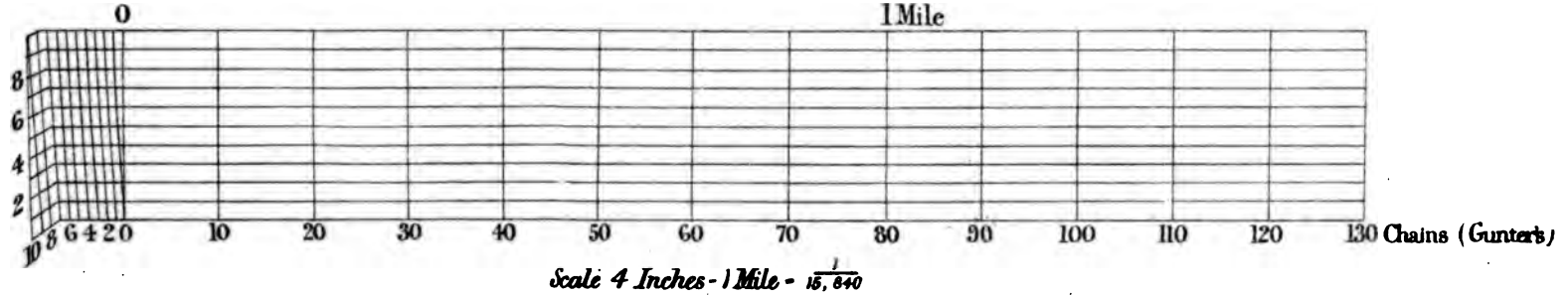


*a b* = setting-point distance.

When the scale of survey is small, and the setting-point distance of 10,000 feet becomes so short on paper, that a line passing through the setting point and a reading on the tangent scale might intersect the scale of relative heights at too acute an angle to give a good result, the setting point of a larger scale may be used with advantage. Thus the setting point for the scale of 4 inches to a mile may be used to obtain relative heights when the scale of survey is 1 inch to a mile. In this case the distance between the observer's position and his distant observed point is taken off the plane table with the compasses, and the compasses are made to step 4 such intervals along the horizontal line from *P*, thus giving a length on the 4-inch scale equivalent to the distance measured off on the 1 inch scale. The relative height is then obtained as if the measurement from the plane table had been made on the 4-inch scale.

In all ordinary cases the arrangement which has been described is quite sufficient, the scale of relative heights as drawn on the accompanying diagram being made to serve for both elevations and depressions.


Decimal Scale of Tangents (copied from Scale on Plane table.)
.02 .04 .06 .08 .10 .12 .14 .16 .18 .20
Decimal Scale of Tangents.
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 feet.
Scale of Relative Heights.




Scale 4 Inches - 1 Mile - $\frac{1}{15,840}$

But in the case of the most inexperienced native pupil, it might be necessary to extend the scale of relative heights from *P* in both directions. In this case the pupil would be furnished with a plane table having such a scale along the eastern margin of its graticule, the horizontal line drawn from *P* being made to coincide with a parallel of latitude about the centre of the board, and his detached triangle would be graduated on both sides of the paper.

As the trigonometrical and traverse heights of a topographical Survey, such as the Konkan Survey, are always fairly numerous and well distributed, the bases measured from the plane tables for obtaining relative or approximate heights need never be of great length. In the case of native surveyors, these bases or horizontal distances should not exceed 2 miles, or 160 chains, in length, and the angles of elevation or depression taken with the clinometer to trigonometrical or traverse points would not ordinarily exceed about 12°. The scale of tangents on the detached triangle, or on the vertical line from *P*, is restricted accordingly. With a range so limited, the values of an approximate height obtained from clinometrical observations to several distant points whose heights are known, are very accurate and accordant.

It would appear, from what has been quoted from the Surveyor-General's Circular Orders, that for ordinary topographical purposes, and when the bases just mentioned do not exceed 2 miles in length, it is unnecessary to correct approximate heights for curvature and refraction; for that correction when the base measures 2 miles is not much more than 2 feet. Such a refinement need not be attempted by the native surveyors; but when greater accuracy is desired, or when the clinometer is employed at distances exceeding 2 miles, the resulting approximate heights should be corrected for curvature and refraction. If D = the distance *in miles*, and C = the required correction for curvature and refraction *in feet*, it will be found that $C = \frac{58}{100} D^2$; so that it is only necessary to multiply the square of the distance in miles by 58, and cut off the last two figures of the product, to obtain the correction in feet. When the distance does not exceed 5 miles, the still-more-easily calculated equation $C = \frac{6}{10} D^2$ will be found sufficiently accurate.

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